Boston Medical Library
in the Francis A. Countway
Library of Medicine ~ *Boston*

Digitized by the Internet Archive
in 2011 with funding from
Open Knowledge Commons and Harvard Medical School

http://www.archive.org/details/medicalapplicati00smit

Dr John C Cheesman
Company

22 5.

MEDICAL APPLICATION

OF

John C. Cheesman

ELECTRO-MAGNETISM.

BY

John C Cheesman

SAMUEL B. SMITH.

ELECTRO-MAGNETIC THERAPEUTIST,

AND INVENTOR OF THE DIRECT AND TO-AND-FRO CURRENT ELECTRO-MAGNETIC MACHINE.

NO. 89 CANAL STREET, N. Y.

Fourth Edition,—Postage 1 *cent.*

New-York:
PRINTED FOR THE PUBLISHER,
1853.

Entered according to Act of Congress, in the year one thousand eight hundred and fifty, by SAMUEL B SMITH, in the Clerk's Office of the District Court of the Southern District of New York

THE

MEDICAL APPLICATION

OF

ELECTRO-MAGNETISM.

BY

SAMUEL B. SMITH,

ELECTRO-MAGNETIC THERAPEUTIST,

AND INVENTOR OF THE DIRECT AND TO-AND-FRO CURRENT ELECTRO-MAGNETIC MACHINE.

NO. 89 CANAL STREET, N. Y.

Fourth Edition,—Postage 1 *cent.*

New-York:

PRINTED FOR THE PUBLISHER,

1853.

Entered according to Act of Congress, in the year one thousand eight hundred and fifty, by SAMUEL B SMITH, in the Clerk's Office of the District Court of the Southern District of New York.

DR. S. B. SMITH'S NEW WORK,

ENTITLED

"THE MEDICAL APPLICATION OF ELECTRO-MAGNETISM."

Fourth edition, being an enlargement of the third, with important additional matter in relation to his lately invented DIRECT AND TO-AND-FRO CURRENT ELECTRO-MAGNETIC MACHINE:—

Printed on fine paper, 96 pages, *Octavo:* Bound in figured cloth, 50 cts. In colored paper, 25 cts. Postage one cent.

Principal Depot, No. 89 Canal street, New York.

I believe that this is the only practical work on the application of Electro-Magnetism as a medical agent, that has ever been issued from the press. There are several works, published on the subject of Electricity and Magnetism, but none in which full and general directions are given for applying this agent, although from the title-page of some of them, such might be presumed to be the case.

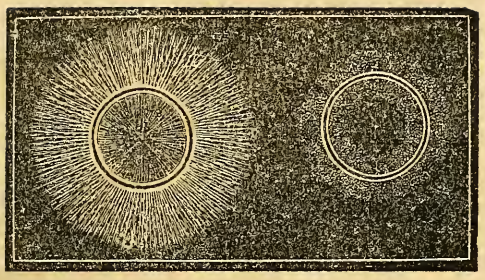
The cures laid before the public in this work were effected by the TORPEDO Electro-Magnetic Machine which I invented several years ago. Subsequently, in the latter part of the year 1853, I made a very important improvement to this Machine by constructing it in such a manner that it gives out the DIRECT Current as well as the TO-AND-FRO Current.

This DIRECT CURRENT, is considered to be of so great importance, that SMEE, in his Electro-Biology, page 97, says, "For electro-therapeutics, or even for all purposes, it is advisable that the current should act in one uniform direction, and that it should not be a To-and-fro current, as is ordinarily produced."

Golding Bird, Professor of Materia Medica, in Guy's Hospital, London, had for some time, been endeavoring to construct a Direct Current Electro-Magnetic Machine, and at last, as he tells us, he "succeeded in contriving one which answers the purpose most completely." The one which he has invented derives its power from the ordinary battery zinc, copper and acid, and the Direct Current is obtained from it by means of a CRANK. "Hence," (he continues) "by this instrument we have succeeded in obtaining the Direct Current, although we have *lost the great convenience* of the *automaton movement* of the To-and-fro current Machine." (Vide *Electricity and Magnetism* by Golding Bird, p. 121.)

By the Machine which I have invented, and now, for the first, offer to the public, the automaton movement is retained, the crank of Dr. Bird's machine being entirely dispensed with.

I cannot, however, with SMEE, say, that the Direct Current is the *only* current that ought to be used in medical practice. I admit that there are many cases in which the Direct Current only ought to be used, and where the To-and-fro current would be entirely inefficacious. The To-and-fro current would be inefficacious in all cases where a *specific polar action* is wanted. For what is meant by this polar action, I refer the reader to the latter part of my book.



The above engraving represents the Positive and Negative action of the Electro-magnetic poles.

By this interesting and beautiful experiment is manifested the great difference there must be in the physiological and the chemical action of the two Electro-magnetic forces, the positive and negative. The one, we see, is expansive in its action; the other, contractive. Hence, in applying these forces as a therapeutic agent, it is of the greatest importance that they be properly applied.

(*See page* 23.)

AN EXPERIMENT

On two Rabbits, illustrative of the similarity of action in the Nervous. Vital, and the Electric Fluids, the function of digestion being performed by either.

(*See page* 13.)

MEDICAL APPLICATION

OF

ELECTRO-MAGNETISM.

I have couched this treatise under the title of MEDICAL APPLICATION OF ELECTRO-MAGNETISM, because I consider that it is in this form of the electric power, that the therapeutic effects of electricity shine forth in the greatest splendor. This too, is admitted by some of the best writers on the subject.

"There are, however, other modes," (says the British and Foreign Medical Review, April, 1849,) "of applying medical electricity, besides the electrical machine; namely, the Electro-magnetic apparatus, and ordinary galvanism. While by the common electric machine we obtain *small quantities* of electricty in a state of *high tension*, by the Electro-magnetic apparatus we obtain large quantities of electricity of a much lower tension, but yet far higher than when evolved from the galvanic trough. Galvanic electricity is now seldom employed for medical purposes, and, indeed, may be said to be almost entirely superseded by the Electro-magnetic current, one of the brilliant discoveries of our illustrious countryman, Farraday."

There is no doubt but that the electric power, emanating from the voltaic battery is, in many cases, a valuable medical agent. There are several reasons, however, why it is not in more general use. In the first place, it is too bulky conveniently to be conveyed from place to place, where it might be wanted. And the solution for running it, being the strong acids diluted, could not, without considerable inconvenience and risk, be carried about from place to place. And, lastly, the cures effected by Electro-magnetism are of so universal a nature, and of so striking a character, that it is doubtful if there is a single case curable by voltaic electricity, which may not be successfully treated by electro-magnetism. The instrument, withal, is small, convenient, and portable; and is run, too, with a comparatively weak solution of sulphate of copper.

In order, however, that the therapeutic effects of voltaic electricity may be appreciated, I will adduce a number of well authenticated cases, where it has been successfully applied.

Within the last five years the demand for Electro-magnetic Machines has been very great. The public generally, as well as the medical profession, are becoming more and more convinced that Electro-magnetism, as a therapeutic agent, is a blessing to the world. Hitherto there has been a serious want of some plain, efficient, and practical

guide in applying the machine. Many have purchased the machines of different manufacturers, with either no directions at all, as to the manner of applying them, or with directions entirely too superficial, and inadequate to the variety of diseases to which they are applicable.

In the treatise which is now about to be laid before the public, I shall endeavor to present them with a plain practical guide in the use of the Electro-magnetic Machine, by the aid of which, they may be able to apply it in the most efficacious manner for the various diseases to which it is applicable.

The sources whence this knowledge of the therapeutic effects of Electro-magnetism has been derived, are various. I shall, of course, impart the knowledge I have obtained practically by my own use of the machine, as well as that which I have acquired from some of the many agents whom I have applying the machines in different sections of the country, I shall, also, avail myself of information from the practical experience of some of the most eminent of the medical profession in Europe, as derived from their works recently published on the subject by themselves, or brought into notice by the medical and scientific journals of the day.

As Electro-magnetism, as a curative agent, has, comparatively, been but lately introduced, there are, of course, many who are entirely ignorant of its virtues, and some, probably, from erroneous impressions, who are quite prejudiced against it.

In order, therefore, that the subject may be set forth in such a light, that those unacquainted with its merits may have the means of appreciating them, and those who are prejudiced against it, have an opportunity of removing those prejudices, I will endeavor to point out in what manner this wonderful agent, *electricity*, operates on the human organism, and to demonstrate its utility from the deductions which necessarily must follow.

But above all, I shall bring forward in demonstration of the wonderful virtues of electric power, the great and varied cures effected by it both in Europe and in this country.

DIAGNOSIS OF DISEASE

BY MEANS OF THE ELECTRO-MAGNETIC MACHINE.

One of the most striking advantages of the electro-magnetic machine is, that by its aid we are enabled to ascertain the location of disease with great precision. When the body is in health, the electric forces, which pervade the whole organism, are in a state of equilibrium; that is, all the multitude of muscular batteries which are continually in opesation, with the peripheral and central battery, are in a condition to engender and transmit the electric force to all parts of the body. Under these conditions, the negative and positive state of the body cause the electric or nervous force to flow with the velocity of lightning through all parts. This flow is not with equal intensity in every part of the body, but varies according to the variation of the electric condition of

the parts through which it passes. The interruption of this universal harmony is the cause of disease; and, indeed, it is this, and this alone, which constitutes disease. It is the same here as in the world around us, and in the world above us. When the equilibrium of the electric forces are undisturbed, the air moves along in gentle zephyrs, all nature looks smiling, and we feel its invigorating influence both physically and psychologically. Let this equilibrium be disturbed, however, and we see the clouds gathering, the air feels damp and chilly, and the electric forces of our own body are affected by the electric disturbance of the atmosphere. When the equilibrium is restored again by the falling of the rain, or the dispersion of the clouds, nature resumes her wonted serenity, the body feels invigorated, the mind regains her buoyancy.

In whatever part of the body, therefore, the disease is located, there is the electric or nervous interruption. This interruption may be either negative or positive; may cause inflammatory or paralytic affections. In either case, Electro-magnetism points it out. In searching for the disease, let the left hand or positive button of the Torpedo Magnetic Machine be placed on the spinal column, and pass the right hand or negative button over the different parts of the body, in the vicinity of the spot where the positive button is held on the spine. If any part in that vicinity is diseased it will be indicated, if the disease be inflammatory, by the sensation of soreness as the electric current passes through it: If the disease is not inflammatory, nothing will be felt but the ordinary contractions produced by the electric passage. In some cases of paralysis, even a strong power of the machine can scarcely be felt at all.

In making the search, care must be taken to apply the positive button to the seat of the nerves of the spinal chord, and the negative over the parts to which their ramifications extend.

In order to judge competently in this matter, some experience will be required; because some parts of the body are much more susceptible to the electric impressions than others.

When the passage of the electric current, of a moderate intensity, produces an agreeable sensation, the indication is that of a healthy state.

THE HUMAN BODY PHYSIOLGICALLY ACTS ON THE PRINCIPLE OF THE GALVANIC BATTERY.

There has recently been issued from the press in London, a work entitled "*Elements of Electro-Biology, or the Voltaic Mechanism of Man, &c.*" by Alfred Smee, F. R. S. In this work, which is of deep experimental research, the author, I think, has evinced a most praiseworthy patience, having devoted at intervals ten years to the subject, and spared no pains in proving the theory he advances, by experiments that seem conclusive. It appears, then, I think clear, from the researches of this great physiologist, that the human body, as well as all animate bodies, perform their functions, precisely on the principles of the voltaic battery: "But," (as our author observes) "the ordinary

forms of voltaic battery would not answer to the physical mechanism of man. A human being contains no metallic plates, no metallic wires, but consists solely of animal membranes and fluids; and, therefore, we have to study voltaic batteries, solely composed of membranes and fluids, with connecting apparatus, the parts of which, may be imitated by the materials naturally existing in the body."

Liebig has already stated, that "Professor Buff has, at his request, constructed a pile, consisting of discs of paste-board moistened with blood, of muscular substance (flesh), and of brain. This arrangement caused a very powerful deflection of the needle of the galvanometer, indicating a current in the direction of the blood to the muscle."

Before the time of Liebig, Galvani had shewn that convulsions ensued in a limb, by simply bringing into connection the muscles and the nerves. In the muscles there is a nitrogenized material which is acid; and in the blood there is a nitrogenized material which is alkaline; and the connecting part or nervous fibres are neutral.

"In proof of this theory," (continues Smee,) "the first animal which was honored was a black rabbit, into the masseter of which I introduced one sewing-needle, whilst the second was placed in the subcutaneous cellular tissue. After leaving them for a few minutes, so that they might be in the same state, they were connected with the galvanometer, without sensible deflection of the needle. After a a few moments, the animal, not liking its treatment, made an attempt to bite my fingers, and the deflection of the galvanometer instantly showed the mechanism of volition. I then gave the creature a piece of wood to bite, upon which, it used all its powers of mastication, and by catching the oscillation of the needle, a very powerful current was exhibited. In this experiment, the deflection of the needle in the electro-voltaic current proved the existence of a voltaic current passing through the parts during the action of biting; and did thus denote the mechanism of the force employed to throw the muscles into operation.

"If we examine the nerve fibres in recently killed animals, we find that they consist of fine tubes containing a fluid, and lined with a peculiar species of fat, which may be obtained from their prolongation into the brain in large quantities, when the part is soaked in alcohol for a long period. In this structure we have all the conditions necessary to insulation, namely, a fine membranous tube with fat on its inner side, and containing a fluid in the centre; and such a structure, so far as electrical purposes are concerned, would be analogous to a glass tube containing liquid."—*Electro-Biol.* p. 7, 8.

"If we follow the course of the nerves, we find that they are prolonged to the brain, and end in the grey matter, where they again come in contact with a large quantity of blood-vessels. As the two series of nerves are not immediately connected in the brain, it follows, according to the laws of voltaic action, that another battery exists there, which may be termed the Central Battery.

"For the continuance of animal life, it is necessary to have an integrity in the central and peripheral batteries; both requiring to be supplied with the normal exciting fluid, or blood. The poles of these respective batteries are connected by the nerves, to form one consistent

whole, which I shall hereafter mention under the term electro-biological circuit. For the integrity of this circuit, it is essential that the peripheral and central batteries be perfect, that their connections be maintained, and that a proper existing fluid, or bright arterial blood, be distributed to each part."—*Ibid.* p. 9.

Matteucci, in his "Lectures on the Physical Phenomena of Living Beings," says, "It would be absurd to suppose that the chemical actions of living beings, all of which produce heat, and often light, would not be accompanied by the production of electricity."

Here is a very simple and easily executed experiment, which proves the existence of an electrical current, which is produced when we connect, by means of a connecting body, two different parts of the same muscular mass, belonging either to the living animal, or to one recently killed.

Galvaniscopic Frog.—A frog is prepared according to the usual method of Galvani, that is, we cut it through the middle of the pelvis, separate carefully all the muscles of the thigh, and divide one of the lumbar plexuses as it passes out of the vertebral column. We then have the nerve of a frog united to its long nervous filament, composed of the lumbar plexus, and of its prolongation in the thigh, that is to say, of the crural nerve. The frog thus prepared, and which is called the *galvaniscopic frog*, is very useful in researches on the electric current. For this purpose we introduce the claw of the frog into a glass tube covered with an insulating varnish, take hold of the tube with the hand, and afterwards bring any two parts of the body, whose electric state we wish to examine, in contact with two different and sufficiently distant parts of the nervous filament of the galvaniscopic frog.

If we take the precaution of not touching the body with any portion of the muscle of the leg, and if the limb be well insulated from the hand, we may be certain that the contraction which the galvaniscopic frog suffers, is due to a current produced in the body touched, and that the nerve of the frog only conducts it and renders it evident by the contraction of the muscle.

Electric Current in Muscles.—"Furnished with a frog thus prepared, we take a living pigeon for example, slightly cut its pectoral muscle, after having carefully removed the integuments, and introduce into the wound the nerve of the galvaniscopic frog.

"You observe the contraction of the frog. If you reflect on the arrangement, you will be satisfied that it is absolutely necessary to touch two distinct parts of the pectoral muscle of the pigeon, with two different parts of the nervous filament. If we apply the extremity of the nerve to the bottom of the wound, and another portion of the nerve to the lips of the wound, or better still, to the external surface of the muscle, the frog continually contracts. This experiment clearly demonstrates the presence of an electrical current, which circulates in the nerve, since it is necessary to form a circuit of which the nerve is a part. If you have any doubt that the contractions of the frog are really exerted by a current due to the different parts of the muscle of the animal, you will soon be convinced by finding that no contractions

are produced when two different parts of the nerve of the frog are touched with one liquid, or with a perfectly homogeneous conducting body.

"Do not suppose that the blood is more apt than any other conducting liquid, to excite contractions in the muscle of the galvaniscopic frog I let fall a drop of the blood of this same pigeon upon a glass plate, and place two distinct parts of this drop in communication with two points of the nerve of the frog, but it evinces no contraction.

"The phenomenon which you have witnessed in the pigeon, takes place in every other animal, whether warm or cold blooded.

"I have recently proved, that the galvaniscopic frog gives the same signs when we operate upon a wound made in the muscle of a man.

"But it is necessary to have recourse to the galvanometer to place beyond doubt the existence of this current, to discover its direction, and to determine its intensity relatively both to the condition of life or death, and to the position of the animal in the scale of beings; in a word, to study its laws.

"I expose the pectoral muscle of a living pigeon, I make a wound in it, and quickly convey the two platinum extremities of a very delicate galvanometer, the one to the external surface of the muscle, the other to the interior of the wound. You perceive that the needle instantly deviates from 15° to 20°, and even more; thus demonstrating the existence of a current whose direction is from the internal part of the muscle to the surface of the same muscle."—*Matteucci's Physic. Phenom.* p. 186-189.

Influence of the Organic Condition of Muscle.—"When we examine the muscles of animals," (continues the same author,) "which have been kept without food, or in which blood circulates slowly, or is entirely intercepted, we see that the current has lost much of its intensity.

"If, on the contrary, the muscles have been, for some time, the seat of inflammation, or have been gorged with blood, or belong to animals that have been well fed, the muscular current shows more intensity, and continues for a longer period.

"I have especially experimented on frogs, because they are more capable of resisting the sufferings to which they are subjected, in these researches, than other animals."—*Ibid.* p. 197.

Sources of Muscular Current.—"The origin of this current," (continues the same writer,) "resides in the electric conditions which are produced by the chemical actions of the nutrition of the muscle. The blood, charged with oxygen, and the muscular fibre, which becomes transformed on contact with this liquid, compose the elements of a pile: they are the liquid acid and zinc."—*Ibid.* p. 200.

Matteucci, after having clearly demonstrated the existence of the electrical current, in the muscles, says, "I wished to ascertain whether the other tissues and organs of animals, the membranes, the nerves, the brain, the liver, and the lungs, denoted the presence of an electric current. I have invariably obtained very feeble signs of it. The heart, alone, gave indications of a very strong current, but, as you know, the heart is a muscle. It is unnecessary for me to tell you that

I tried the analogous experiments on the liver, &c., by forming a pile with portions of their tissue, or organs, as in the case of the muscles, and that I took the same precautions."—*Phys. Phenom.* p. 194.

"Many of the experiments which I made," (continues the same writer,) "convinced me that if the nervous system which supplies the muscles, be destroyed, the latter do not lose the property of manifesting the electrical current. I formed a pile of muscles, deprived of their nerves, with every possible care; with other muscles taken from frogs, a considerable part of whose spinal marrow I had destroyed some days before with a red hot iron, or which I had killed by opium; but no perceptible difference was manifested between the intensity of the current produced by these piles, and that of the current caused by the same number of muscular elements taken from the entire frog."—*Ibid.* p. 195.

I would observe in regard to the experiments above spoken of, as having been made on the brain, nerves, liver, &c., that the conditions requisite for the manifestation of the electric phenomena were wanting in the manner of performing the experiment. In the experiments performed on the muscles, there existed the two opposite poles in the muscle itself, consequently, a complete electric current being thus formed, the electrometer would indicate it very forcibly.

The experiments performed by Matteucci would only prove, that, in the brain, liver, tissues, membranes, lungs, &c., of animals, there are not *two electric poles.*

That the success of Matteucci's experiments on muscular electricity depended on the above conditions, is evident from his own words, where he says, "The origin of this current in the muscles, resides in the electric conditions which are produced by the chemical actions of the nutrition of the muscles. The blood charged with oxygen, and the muscular fibre, which becomes transformed on contact with this liquid, compose the elements of a galvanic pile: they are the liquid acid and zinc."

The well-known experiments on rabbits performed in England by Dr. Wilson Philip, and in France by Dr. Legalois and others, demonstrate the existence of an electric current, or what is an equivalent to it, from the brain through the whole nervous system. In these experiments two rabbits were selected which had been fed with the same kind and quality of food. On one of them they performed the operation of cutting the pneumo-gastric nerve leading to the stomach. The stomach of the animal being thus deprived of the nervous stimulant, ceased to perform its office, and death ultimately ensued. The other rabbit, which was not operated on, was killed after an interval of about twenty-six hours. In the stomach of the one which had not been operated on, the food was found entirely digested, but in the stomach of the other the food remained almost as crude and undigested as when first taken into the stomach. This part of the experiment shows that the stomach depends, for the performance of its functions, on the nervous fluid.

A second experiment was made upon two other rabbits, fed in the same manner as the former. The nerves leading to the stomach in

one of them, was also cut, to which he applied the electro-galvanic power from a small galvanic battery, in such a manner that the galvanic fluid passed into the stomach in the same way that the nervous fluid passed before the nerve was cut. At the end of the twenty-six hours, as in the previous case, they were both killed, and it was found that the food in the stomach of the one whose nerves had been cut, and put in connection with the galvanic battery, was nearly as well digested as in the other which had not been operated on. Similar experiments were tried on the heart and other organs, in all of which the same results took place, *i. e.* the organs ceased to perform their functions when the nerves were cut, and commenced again as soon as the galvanic fluid was applied.

Taking a view of all the phenomena exhibited by the experiments of the above able physiologists, the following conclusions are manifest.

First. That the human body, and all animate bodies, are an electro-galvanic apparatus: and,

Secondly: That the brain is the grand reservoir of the electric force generated by the muscles; and that it is also the great *Negative Pole* of the whole nervous system.

"It is," (says Smee, in his elaborate work on Electro-Biology,) "by the specific organizations of the eye, the ear, the nose, the mouth, and the skin, that man is made acquainted with the external world. All these agree in constituting the positive pole of the great peripheral battery of the Electro-biological circuit."—*Electro-Biol.* p. 26.

"Electricity," (says Pallas,) "is the physical agent, by the aid of which, the nervous system performs its functions."—*Emm. Pallas De l'Electricité sur l'Organism*, p. 303.

THE DIFFERENT KINDS OF ELECTRICITY.

Frictional electricity, or that produced by friction of any non-conducting substance—such as the common electrical machine, with great intensity, but very feeble quantity. Lightning electricity, which is eliminated during the formation of a thunder-cloud. It is distinguished both for its vast quantity, and for its enormous tensity.

Animal electricity, such as that found in the electric eel, and torpedo, great both in quantity and intensity; sufficient instantly to kill their prey by directing a current through them.

Hydro-electricity, which is a very powerful electric current produced by high-pressure steam, by means of a peculiar apparatus, called a hydro-electric machine.

Thermo-electricity, which is a very feeble current of electricity set in motion when alternate bars of various metals, but particularly of bismuth and antimony, are soldered together. The electricity thus evolved, possesses but little of the property of quantity, and less of intensity. No use for it has been found in electro-therapeutics.

Voltaic electricity is that form of electricity which is set in motion in a voltaic battery, and is remarkable for the enormous quantity of electricity evolved, with but little power to overcome obstacles.

"We may cause voltaic electricity," (as Smee observes,) to act upon the body in a very simple manner; for instance, by simply enclosing a portion of the body between two dissimilar metals, a current is generated; thus, if a piece of zinc be placed on the under surface of the tongue, and a piece of copper or silver at the upper, a circuit is formed, and we know that voltaic action has occurred, from the organ of taste being stimulated, and a peculiar gustatory sensation produced.

"Such a mode of excitation," (continues he,) will answer for mucous membranes, which are constantly moist. It would also answer for the skins of frogs, but our skins do not seem to be favorable to the transmission of such impressions, and consequently, galvanic rings, galvanic bracelets, and all similar electro-therapeutic curiosities, may be supposed to be quite inert. Some years ago, there was a vast rage for such contrivances; so much so, that, for a time, it was difficult to supply the demand. Of course, abundance of testimony could be produced of their efficacy; in fact, as much as for any other quackery; but, from an impartial investigation as to their merits, there appeared to be no sufficient ground for supposing that they possessed any influence."—*Elem. of Electro-Biol.* p. 91.

Electro-magnetic electricity, which constitues the ordinary magnetic machines for medical purposes. These give out an intermittent current of intensity from a primary current of quantity. If we have a certain amount of action in a single voltaic battery, it gives us the effect of quantity; when the action takes place in a series, it gives us the effect of intensity. This intermittent current is obtained by a power of electricity, when passing through a wire, to develop a second current in a contiguous wire parallel to the first, and insulated from it. The second current is generated whenever the battery is either made or broken, but the direction of the current in the two instances is opposite. Whenever the circuit is completed through the first wire, a current of strong tension is produced in the secondary. This current is in the same direction when the circuit is made, in the contrary direction when the circuit is broken.

The Electro-magnetic Machine gives us intensity with but very feeble quantity, and "therefore," (as Smee observes,) "it is safe even in the hands of the incipient tyro."—*Elem. Electro-Biol.* p. 98.

INEFFICIENCY OF FRICTIONAL ELECTRICITY.

"From my experiments," (say Smee,) "both upon animals and plants, the utility of *tension* (which characterizes frictional electricity) as a therapeutic agent is very slight, or even doubtful. We are, almost always, under more or less tension; as, normally, the air is positive, while the surface of the earth, with all objects upon it, is negative. Perhaps, as a matter of observation, I may assert, that the absence of electricity produces uncomfortable feelings in many persons; and perhaps, an excess is also unpleasant. We find that nervous females constantly suffer before a thunder-storm; and hysterical females show marks of hysteria. In these cases, however, it is difficult to tell whether the effect is owing to the electricity, or to

other causes. When the storm is absolutely raging, fear may be the cause of the result. I have sometimes seen terrible effects produced by the alarm of a thunder-storm."—*Ibid.* p. 86

"Neither the Leyden jar, nor Voltaic battery are, at present, employed for therapeutic purposes."—*Ib.* p. 89.

AN EXPERIMENT SHOWING THAT ANIMAL MATTER, IN COMMON WITH METALS, IS SUSCEPTIBLE OF ELECTRO-POLARIZATION, NEGATIVE AND POSITIVE.

For this purpose, let the hind legs of a skinned frog be suspended by a glass supporter, and held at some distance above the prime conductor of an electric machine. Whilst the machine is still in action, I remove the limbs of the frog to a distance, and place it on the cap of a Bennet's gold leaf electrometer, and I find that the leaves diverge with negative electric action. From this we see that a whole animal body, as well as a detached part, would become electro-positive by being placed in the vicinity of the *negative* conductor; for in that instance the animal would become electro-polar, by lessening the pressure on that particular side next to the conductor, and the remote being thus rendered electro-negative, would present an opportunity for the introduction of fluid from the surrounding air.

The effect on animals, of the discharge of their negative and positive states, is beautifully shown as follows:

Take two or more hind legs of frogs prepared in the ordinary way for galvanic experiments, and suspend them by a rod of glass, the foot of each being tied with thread to the dorsal end of the other alternately. Then introduce a thin glass rod between the crural nerves of the lower frog, and raising it bring it in contact with the feet of the upper frog. At every contact both frogs are convulsed, showing, in a decided manner, the electric and vital action of organized beings.

THE NERVES INSULATED.—IN ALL MATTER, ORGANIC AND INORGANIC, THERE IS A SPECIFIC ELECTRIC CHARGE WITH DIFFERENT DEGREES OF INTENSITY.

"The nerves," (says Emm. Pallas,) "are formed of filaments lined with a greasy substance suitable for completely insulating them between themselves and the adjacent parts."—*Pallas de l'Influ. de l'Electric.* p. 39.

"As in metals and other inorganic matter, so in organized inanimate, and all animated beings, there resides a specific electric charge. This charge is not uniformly distributed, even in one and the same individual body. In the animal system, the extent of the charge in the nerves is very different from that in the muscles; hence, each individual organism in the animal body has its specific charge of the electric matter."—*Sturgeon's Galvanism*, p. 13.

"In the animal frame, the different organisms of which it is constituted, are naturally charged with the electric fluid in different degrees of density or intensity; for instance, the nerves and muscles have each

a natural charge peculiar to itself, and, in accordance to its susceptibility, for the susceptibilities of becoming electrically charged, differ considerably in bodies of different kinds, indeed, in those of the same kind when differing in structure. Hence, since the organization of muscle and nerve differ from each other, so must their natural electric charges differ also."—*Ib.* p. 42.

But the most striking cases of animal electricity are those exhibited by the Torpedo, and the Electric Eel, which are endowed with such formidable electric powers, as to destroy other fishes by their discharges, which they are capable of delivering at their own will. It is thus they procure their prey among the smaller tribes of fishes, and probably, parry of their enemies amongst the larger ones.

PECULIARITIES OF ELECTRIC IRRITATION OF THE NERVES.

"Electricity," (says Matteucci,) "is the only irritant which can excite, at one time sensation, and, at another, contraction, according to the direction in which it traverses a nerve.

"The electric current has no effect on the nerves, that is, it neither causes contraction nor sensation, when its action on the nerve is prolonged.

"The electric current alone can modify the excitability of a nerve, and even rapidly destroy it, when the current circulates in a certain direction, (that is, in the direction of the nervous current,) and can preserve or augment the excitability when passing in the opposite direction.

"Lastly, of all irritating agents, the electric current is the only one which possesses, for a long space of time, the power of reviving the excitability of the nerve, when it has become very much enfeebled in respect to other stimulants."—*Physic. Phenom.* p. 281.

"The nervous force," (says Matteucci,) "is transformed into electricity under the influence of the peculiar structures of the organs of the electric fishes."—*Ib.* p. 287. If so, then no reason can exist why the electric force may not also be transformed into the nervous force, under the influence of vital action.

"Whenever a movement occurs," (says Matteucci,) "or the effect of force is manifested, we are certain that some transformation of matter must have taken place. Whenever a force is exerted, a chemical action precedes it. Caloric, electricity, and light furnish us, at every instant, with evidences of this truth."—*Ib.* p. 321.

ELECTRO-BIOLOGICAL CIRCUIT.

"For the integrity of this circuit, it is essential" (says Smee,) "that the peripheral and central batteries be perfect, that their connection be maintained, and that a proper exciting fluid, or bright arterial blood be distributed to each part.

"With regard to the cells of animal bodies, (which cells all organic beings are resolvable into,) one of the most wonderful and extraordinary results which I have observed, is the action of electricity derived

from the intermittent current of the various forms of electro-magnetic machines. When a frog's foot is arranged in the field of a miscroscope, and the intermittent current is directed through the animal, the circulation instantly stops, as though by magic. The current in the veins, indeed, seems slightly to retrograde, though it still continues its course for a short period in the arteries; the whole effect giving the appearance of all the corpuscules having a tendency to be drawn into the capillaries.

"In consequence of the corpuscules being drawn into the capillaries, an engorgement of them results. When, however, the current is withdrawn, the blood moves again more rapidly than before, and is instantaneously again stopped, when the current is renewed.

"The action of the intermittent current is as decided upon the lymph-corpuscules, as it is upon the common corpuscules; for although, ordinarily, they run their course at a very different rate from the common corpuscules, they are stopped as suddenly by the intermittent current. The interference with the circulation of the lymph-corpuscule in the capillaries, is of more importance than the common corpuscule; because crawling along the side of the vessel, and apparently in contact with it, it is manifestly less acted upon by the *vis a tergo* of the heart's action.

"I need hardly state, that the bearing of these experiments is in the highest degree important; for it shows, that, in whatever process of the body, blood is necessary, there the electric force must have an influence. As it is manifest that the circulation of the blood affects, more or less, every operation of the body, I need hardly state, that the *experiment demonstrates the importance of electricity as a therapeutic agent.*"—*Smee's Electro-Biol.* p. 72-73.

Electro-statics and Dynamics.—Electrical phenomena are usually classified under two general heads, viz:—Electro-statics and Electro-dynamics. The former class comprehends every class of electric equilibrium; and the latter class every phenomena emanating from electric currents, whether momentary or of long duration.

The Electric Fluid Expansive in its Passage.—"It must not be supposed that the electric fluid traverses the body in a narrow channel between the two conductors. Every spark produces an electric *wave* in the system, which extends laterally, more or less, according to the power of the spark."—*Sturgeon's Electr.* p. 172.

SOME OF THE

WONDERFUL PROPERTIES OF ELECTRO-MAGNETISM

Previously to entering into a detail of the cures effected by Electro-magnetism, and other applications of the electric power, I will exhibit some further illustrations of its phenomena. It is a subject which is certainly fraught with interest the most sublime and useful. The mysteries of its nature are becoming more and more developed as the researches of science penetrate into its deep recesses.

What has already been achieved, is but a prestige of what may yet be hoped for.

The following is from Golding Bird's Lecture before the Royal College of Physicians, March, 1847.

"Let me now say in a word," (says he,) "regarding the last of the host of valuable contributions made by our illustrious countryman, Dr. Farraday, to experimental science. He has shown that this magnetism is an agent of far more universal sway than was ever previously guessed at. The lines of force emanating from these poles are potent in their effects upon all forms of solid matter. Some metals, as iron, nickel, cobalt, and paper, cork, and even glass, among other bodies, obey the direct attractions of the poles, and, if free to move, arrange themselves in the direction of these lines of force, and take up their place in a plane connecting the two poles: Such bodies are essentially then, *magnetic*. But there other bodies, including the larger proportions of all varieties of natural substances, which are repelled instead of being attracted by these poles, and when free to move, arrange themselves in a direction at right angles to the magnetic lines of force, as in a plane perpendicular to one connecting the two poles. I will place in the little cradle suspended to the slender thread before me, a bar of iron; I now turn on the electric current, and, in an instant, the iron places itself in a line connecting the two poles. But if I break connection with the source of electricity, and replace the bar of iron by one of bismuth, it will remain quiet, but the instant I render the bars magnetic the bismuth will begin to move, and will rest in a direction at right angles with the poles. Such bodies are termed by Dr. Farraday, dia-magnetics. Thus iron and magnetic bodies being equally attracted, point, with regard to the poles of a magnet, north and south, whilst bismuth and dia-magnetics, being equally repelled, point east and west.

"But the most remarkable effect flowing from these discoveries is that all organized bodies are thus acted upon by the magnet; not only will a piece of wood, a leaf, or an apple thus submit to its influence, but if a man were fully suspended between the poles of a sufficiently large magnet, he, too, would obey its influence, and point east and west: who can predict what wondrous results may flow from this last great contribution to natural science?"—*Lon. Med. Gaz. May*, 1847.

THE FOLLOWING WONDERFUL EFFECTS OF GALVANISM

ON THE HUMAN SYSTEM IS TAKEN FROM THE DUBLIN QUARTERLY JOURNAL OF MEDICAL SCIENCE, MAY, 1847.

"There is a use," (says M. Donovan,) "to which Voltaic electricity may be applied, and to which medical practitioners, in this country, seem to have paid but little attention. Experiment has long since proved the influence which Voltaic electricity exerts over affinity, and to such an extent that compound bodies, in which the component parts are united by the most powerful affinities, are not only decomposed, but their elements are transported to great distances, and are even carried through substances without combining, to which they, nevertheless, have a strong attraction, and to which they would otherwise have united. Some singular instances of this transference have been discovered by philosophers, in connection with the economy of the human body. Sir H. Davy having placed his fingers previously well wetted with distilled water in contact with distilled water in the positive part of the Voltaic circuit, phosphoric, sulphuric, and muriatic acids rapidly passed into the water from his body. On making a similar experiment at the negative side, fixed alkali made its appearance.

"Now," (says Becquerel,) "since acid and alkaline substances can thus be separated from their combinations in the living body by means of electrical power, there is reason to believe that, by the same means, may be introduced into the living body, different substances capable of reacting on the organs in different pathological cases."

"The hint conveyed by Becquerel had been already acted upon.

"Dr. Fabré Palaprat has made some experiments which seem to promise great results, if the subject be sedulously followed up by practitioners. They were as follows:—after having dried as much as possible both arms of a woman, he applied to one of them a compress soaked in a solution of iodide of potassium, which he covered with a plate of platinum in communication with the positive pole of a pile formed of thirty elements, and charged with a liquid adequate to produce decomposition. He placed on the other arm, a compress moistened with amidon, which, being covered with a plate of platinum, was made to communicate with the negative pole. In a few moments, the amidon had assumed a blue color, clearly proving that the iodine had been transported through the interior of the body, since the skin, which was sufficiently dry, could not give passage to a current.

"It appears, therefore, that the constitution of the fluids of the body may be altered, certain principles may be withdrawn, and the ratio of the remaining principles may be changed. A direct control, not possessed by any other medicinal agent, may thus be established, at least into limited localities, with results which it is impossible to anticipate. In the same manner, a new mode of entrance into the human body of active remedial agents is indicated, more quick, more direct, more certain, than any other known, without the risk of being injured, or altered by digestion, or of being eliminated by excretion. The advantage of introducing active remedies into diseased organs directly,

without the intermediate process of absorption or circulation, and, at the same moment withdrawing them from the body without the possibility of leaving residual quantities behind, which might, at length, do mischief, is great and obvious. The process surely deserves a trial: if it succeeds it will be a benefit conferred on human nature, but it can only be conferred by energy, industry, and enterprize on the part of the medical profession."

Electroscope.—By the aid of an electroscope we are enabled to ascertain the different electric states of substances with great precision. For instance, we can detect the different electrical states of the inside and outside of various articles of clothing. A person's coat, when pulled off after a smart walk, is always highly electrical, having the inside and outside in different states."—*Sturgeon's Galv.* p. 81.

ARE THE NERVOUS FORCE

AND THE ELECTRIC FLUID IDENTICAL?

Golding Bird, in a course of Lectures on Electricity and Galvanism, delivered at the Royal College of Physicians, in March, 1847, touching upon this subject, observes, "In concluding my remarks on the physiological relations of electricity, I feel, that although a probable, yet by no means a positive, case is made out for its being regarded as the nervous agent, simply from the fact that we have not yet actually intercepted it in its presumed route through the nerves, still I do not think that all the objections which have, from time to time, been urged against such a view, are, by any means, tenable. We do not contend for the existence of currents of high tension in the body, and hence, the objection that nervous force is stopped by placing a ligature on the nerve, whilst electricity is not, falls to the ground. Another objection, appears, at first sight, more plausible; if the trunk of a nerve be divided in a living animal, we know that the limb to which it is distributed becomes paralyzed. It has been said, that if the nervous force and electricity are identical, the paralysis ought to disappear on uniting the divided ends of the nerves by means of a piece of wire or other conductor of electricity, which is well known not to be the case. In reply to this, and other such objections, the same answer may be given, that it is true, that, although we can prove the existence of electric currents in many of the tissues of the body, yet it is not contended that such currents are really identical with the nervous force, but all that is assumed is, that they bear to each other the relation of cause and effect. An electric current traversing this helix of wire, makes the iron bar, placed in its centre, a powerful magnet; yet no one contends that electricity and magnetism are, as forces, one and the same thing, but merely that they bear to each other the ratio of cause and effect. If I connect the magnet thus made with another bar of iron by means of a copper wire, or any other conductor of electricity, it does not become a magnet. Nor does any one express surprise at this, because that, although electricity can traverse such a

conductor, the new force we have developed, *magnetism*, cannot.—Yet this is an analogous case to the objection urged against the idea of the nervous force being generated by electricity, because we cannot renew it in a paralyzed limb by uniting a divided nerve by means of a piece of wire. I confess I have a presentiment that one of the greatest philosophers of the age was correct when he remarked, if magnetism be a higher relation of force than electricity, nervous power may be one still more exalted, and within the reach of experiment.

"It is proved as we see by the Electro-magnet, that an electric current excites magnetism; and it can also be shown that a magnetic current in its turn, excites electricity."—*Lon. Med. Gaz. July*, 1847.

NO EFFECT OF THE BODY CAN TAKE PLACE

IN ITS ANIMAL LIFE, WITHOUT A CORRESPONDING CHANGE OF MATTER.

Bio-electrolysis brings us to this proposition,—that no effect of the body can take place in its animal life, without a corresponding change of matter. This change of matter continually causes waste, and demands supply. The changed matter forms the effete material, and would clog the system and interfere with the Voltaic agency, were some arrangement not made for renewing them. This is done, for we perceive that the blood absorbs the carbonic acid as soon as formed, and carries it to the lungs, where it is exhaled. The blood also absorbs urea and carries it to the kidneys, to be removed there, whilst, in like manner, it casts off the choleic acid by the liver. If the first process be stopped but for five minutes, death ensues; if the second, life is extinguished in three or four days; and we find that it is no less necessary to throw off the effete matters from the electro-biological circuit, than it is to recharge the ordinary forms of batteries, and cast away the sulphate of zinc. To charge the electro-biological batteries, we must take suitable food; and to keep them in working order, we must eliminate the changed material. The food we take is changed into blood, and Electro-biology shows that the blood is the vivifying agent, and explains how the blood of any animal may, in any sense, be said to be '*the life thereof.*'"—*Smee*, p. 67.

THE BRAIN.

"The requisites of action, blood and nerve, are found in sufficient abundance in the central battery or brain, as that organ is literally nothing but fibres and blood-vessels. The nervous fibres are so numerous, that no estimation could be given of the myriads of which the brain is composed; in fact, the whole of the white matter of the brain is composed of nerve tubes. The blood-vessels are distributed to the grey matter in all parts of the brain, which presents a truly wonderful example of vascular structure when perfectly injected.

"I have been enabled to make the most beautiful injections of the brain and spinal marrow which have ever been executed, by using an injection consisting of carmine dissolved in ammonia, and mixed with

a solution of isinglass. The injection is of an intense color, perfectly fluid, and is thus enabled to penetrate the minutest ramifications of the capillary vessels. In injecting the brain, it is necessary to use one that is perfectly fresh; and I generally inject immediately after the animal is killed. By these means, the most exquisite injections of the brain and spinal chord have been executed; and, in all my preparations, it is shown that wherever the grey matter exists, the blood is distributed, and where the white matter exists, there is no blood; and, upon these considerations, physiologists infer that the grey matter is the active part of the brain."—*Elem. Electro-Biol.* p. 30.

AN EXPERIMENT ILLUSTRATIVE

OF THE NEGATIVE AND POSITIVE ELECTRIC POWER.

"The apparatus required for the performance of this experiment, are an electric machine, a small Leyden jar, a flat cake of pitch, a small tin can with a glass stem for insulation, and a spring puff or bag, containing a mixture of sulphur and red lead.

"The resinous cake being quite dry and free from dust, I place the little can upon it at some short distance from the middle of the surface. I then electrize the inside of the jar negatively, either by placing its knob in connexion with the negative conductor of the machine, or by holding its outer coating against the positive conductor: (the former way is preferable, because the hand has already hold of the body of the jar) which done, I present its ball to the can, from which it recovers a small quantity of its lost fluid. The can, consequently, becomes electro-negative, and its rim, in connection with the resinous cake, renders a ring of the latter also negative.

"I now lift up the can by its glass handle, and, for a moment, touch it with my finger to restore its electric equilibrium. The can is then placed on another part of the resinous surface, the jar discharged, and again recharged with its ball at the prime conductor. A spark is now transmitted from the ball of the jar to the can, which renders it electro-positive; and a considerable portion of this charge is transmitted to the resinous cake, spreading outward by its repulsive attribute, on every side of the can; and, when the latter is removed by its glass handle, the electric fluid advances inward also, until the forces on opposite sides of the centre, balance one another, and completely arrest the fluid's further advance.

"The cake, being thus differently electrized on two parts of its surface, is then placed in a vertical position, and then standing at a considerable distance, I project towards it the mixed powders from the spring bag, which, whilst traversing the air between the bag and the electrized surfaces, become influenced by the latter and attracted by them, according to the strict principles of electric action: the sulphur attaching itself to the positive surface, and the red lead to the negative one.

"The beauty of this experiment is beyond all description, and, in a theoretical point of view, is one of the highest importance. Nothing

short of a personal view of this phenomenon can convey to the mind the real beauty and importance of the experiment.

"A momentary glance at these electrical pictures delights the eye, by the beauty and singularity of their configurations; and, when it is known that they are of electrical production, the curiosity becomes quickly aroused, and the attention immediately fixed upon them. To the mind of the philosopher, these phenomena convey a rich fund of information. Volumes have been written to show the similarity of positive and negative electric action, as indicated by the spark, the shock, the attractions, and the repulsions, &c.; and much has been said and written with the view of supporting the contrary opinion. But the experiment now under contemplation, carries conviction to the mind more forcibly than all the rest that have been brought forward on either side of the question. The first view of these pictures is, of itself, sufficient to distinguish a striking difference in their configurations, and the mind is readily impressed with the idea that their formation arises from different causes. On close inspection, we perceive a seeming animation in the positive or stellar configuration, which expands before our eyes, gradually and uniformly, on every side, until the repulsive electric forces becomes too attenuated to advance the particles of shlphur any further from the centre of action. Inward also from the ring on which the metallic can stood, the particles are seen creeping in converging paths towards a centre which they can only approach, but can never reach, being arrested in their advance by a balance of those very powers which urged them on towards it.

"The negative picture, on the contrary, is dull, without life, and a perfect contrast to the other, yet not without interest. It shows, in the first place, that it is not endued with any force similar to that in the other picture. No repulsive forces are indicated by the motions of the minutest particles of the powder; nor are any ramifications produced, even though the apparatus be permitted to rest unmolested for many hours; the picture remains unchanged from first to last, a mere heavy looking ring of red lead. Around this ring, however, at a considerable distance, and also wiithin it, when its dimensions are considerable, there adheres a portion of the sulphur, whose subsequent motions, with regard to the centre, are in the reverse order to those in the positive picture; for the particles of sulphur within the ring radiate towards it from the centre, and those exterior to the ring travel inwards; hence, both portions advance upon the ring of red lead according to the laws of electrical attraction between two dissimilar electrized bodies. In short, the phenomena exhibited by this experiment afford the most satisfactory demonstration of the distinctive character and capabilities of these two species on the resinous surface, and of the just appropriation of the terms positive and negative, as expressive of their real electric state. On the positive surface we have ocular demonstration of the existence of a repulsive force; on the negative surface there is no indication whatever of any such force being present. Morever, we learn from this experiment, that although intimately connected with each other, the sulphur and red lead were in different electric conditions."—*Sturgeon's Galv.* p. 47.

POSITIVELY ELECTRICAL AND NEGATIVELY ELECTRICAL BODIES.

These terms ought, in all cases, to be understood as implying the electrical conditions of bodies *relatively* to the electric conditions of other bodies, and in no other manner. I will suppose that three metallic spheres, A, B, and C, of precisely the same diameter, uniformity of polish, &c., are insulated, and placed on different parts of a table. I will communicate ten particles of the electric fluid to A, seven particles to B, and five particles to C. Now, although the whole of these bodies are positively electrical, with regard to the surrounding group of bodies in the room, they are, in reality, in different electrical conditions with respect to each other. A, which has the quantity of ten, is positively electrical with respect to the other two; and C, which has only the quantity of five, is negatively electrical with respect to both A and B; and, for the same reason, the body B, is either positively or negatively electrical, accordingly as it is compared with C or A respectively.

The difference, however, of the electric condition of bodies is not always so easily illustrated. Two distinct metallic bodies, in their *natural electrical conditions*, are not always in one and the same electrical condition. And not only are the various substances, constituting the body of the earth, in different *relative* electrical conditions, but the different parts of the same body are also *differently electrical.*

THE DIRECTION TAKEN

BY THE METALS, ACIDS, AND ALKALIES, IN THE VOLTAIC CIRCUIT.

"In the decomposition of the metallic salts, the metals which are liberated, assemble at the *negative* terminal of the battery wires, and the acids, with which they are combined, as uniformly assemble at the *positive* terminal. In illustration of this fact, one or two experiments may here be necessary.

"Into a solution of the sulphate of copper, I introduce two platinum wires, which are the *polar*, or *terminal* wires of the battery. In a few seconds the *receiving* terminal will be covered with copper, but none will appear at the *delivering* terminal. We now reverse the battery connections, making that wire which before received the current from the solution, now deliver the current to it, and that which before was the delivering wire, now be the receiving one. Permitting the action to proceed a few seconds, and then examining the two wires, we find that the copper has entirely disappeared from that on which it was first deposited, and that the other is now cased with copper

We proceed in a similar manner with a solution of the nitrate of silver, employing gold wires instead of platinum ones. The receiving gold wire is soon covered with metallic silver, which, in time, shoots into beautiful needle-like crystals, but none appears on the delivering wire. By reversing the wires with the poles of the battery, the silver

soon leaves that on which it was deposited by the former part of the experiment, and the other receives a silver coating with the shining needles as before."—*Sturgeon's Galv.* p. 167.

BEAUTIFUL EXPERIMENT

IN THE DECOMPOSITION OF THE SULPHATE OF POTASH.

"Take three glass tumblers; place them on a table nearly touching each other. Into one of the exterior glasses pour some pure water, into the other a solution of the sulphate of potash, and into the middle tumbler an infusion of litmus. The contents of the glasses are to have a communication formed between them, by two bundles of moistened asbestos bent over their edges and dipping down into the respective liquids. The terminals of the galvanic battery being now introduced into the two outside glasses, the battery will effect the decomposition of the potash, in whichever of the exterior glasses it be placed; and the acid and alkali will traverse the liquid in the centre vessel in opposite directions, without interfering with each other. The characteristic colors which indicate the current of acid and alkaline matter, will be beautifully displayed in the middle glass, one-half of the liquid of which will appear red, and the other half, a heavy green. Litmus paper immersed in the liquid contained in the positive exterior glass will turn red, and tumeric paper will indicate the presence of free potash in the other exterior glass."—*Sturgeon's Galv.* p. 172.

IN THE ANIMAL BODY

ARE DIFFERENT DEGREES OF ELECTRIC INTENSITY.

The following experiment in animal electricity was made by Professor Aldini, the nephew of Galvani, an experiment which can easily be repeated by any one who can command a frog of strong vital power. The frog is to be prepared in the usual way, and after moistening it in salt water, the operator takes hold of the legs, and brings the crural nerves to his own tongue. The galvanic circuit, in this case, is through the frog and the operator, from the hand to the tongue. The usual commotions are produced at every contact between the nerves and the tongue.

"If several persons," (says Sturgeon,) "form a chain among themselves by joining hands well moistened in salt water, and the person at one end of the extremities of the chain hold the legs of a prepared frog, contractions are produced whenever the circuit is closed by the disengaged hand at the other end of the chain, and the crural nerves of the frog. Many persons have failed in repeating these experiments, from their not operating on large frogs of great activity; and others by not attending strictly to the necessary preparations,

"These experiments would be sufficient evidence of themselves, to convince most physiological enquirers, who have no preconceived notions to support, that, in the animal the different organisms of which it is constituted, are naturally charged with the electric fluid in different degrees of *density*, or *intensity*, as we frequently express ourselves;

ns, for instance, the nerves and muscles have each a natural charge peculiar to itself, and in accordance with its susceptibility ; for the susceptibilities of becoming electrically charged, differ considerably in bodies of different kinds, indeed, in those of the same kind when differing in structure. Hence, since the organization of muscle and nerve differ from each other, so must their natural electric charges differ also."—*Sturgeon's Galv.* p. 62.

ELECTRIC ACTION ON THE FLUIDS.

If a sponge, saturated with water, be suspended from the prime conductor of an electrical machine, the water, when the machine is first worked, will drop slowly from it ; but when the conductor becomes powerfully electrified, it will descend abundantly, and, in the dark will exhibit the appearance of a shower of luminous rain.

Let a small metallic bowl be suspended from the prime conductor of an electrical machine, and let it have a capillary tube of the siphon form immersed in it; or let it have a capillary tube inserted in the bottom, the bore of the tube being so small that water cannot escape from it by its own pressure. When the machine is put in operation, the particles of water becoming electrified will repel each other and immediately an abundant stream will issue from the tube ; and, as the particles of water, after leaving the tube, still exercise reciprocal repulsion, the stream will diverge in the form of a brush.

THE PROPERTIES OF THE MIND

DEDUCED FROM THE VOLTAIC STRUCTURE OF THE BRAIN.

Smee, in the chapter on the "Properties of the Mind, deduced from the Voltaic structure of the Brain," shows us, by a train of reasoning and experiment that certainly are satisfactory, that "personality and infinity give us an idea of the soul ; pleasure and infinity, of good ; pain and infinity, of eternity ; infinity, pleasure, and time, of heaven ; infinity, pain, and time, of hell. Personality, and all the units of sensation, give us an idea of the body ; personality, infinity, and time, of immortality. Personality, and other totalities of senses, give us an idea of the mind ; thought and infinity, of spirit. Lastly, action, infinity, and pleasure conjoined, give us an idea of virtue ; action, infinity, and pain, of vice.

"Thus, we perceive that we know from the very organization of our bodies, that we are immortal ; that God exists; that there is virtue and vice,—a heaven and a hell. Man, in every age, in every climate, is compelled, by his very organization, to believe these first principles." —*Smee's Electro Biol.* p. 46.

ELECTRICITY FROM ACID AND ALKALI IN MUSCLE.

"Within the last few months," (says Golding Bird,) "the results of some researches of Liebig have rendered it very probable that a large proportion of the electricity of muscular structure is owing to the

mutual reaction of an acid and alkaline fluid. Every one is aware that the blood, in a healthy state, exerts a decided and well-worked alkaline action on test-paper; now it is remarkable that although a piece of muscular flesh contains so large a proportion of alkaline blood, still that when chopped up, and digested in water, the infusion thus obtained is actually acid to litmus paper. This curious circumstance is explained by the fact announced by Liebig, that although the blood in the muscle is alkaline from the tribasic phosphate of soda, yet the proper fluids or secretions of the tissues exterior to the capillaries is acid from the presence of free prosphoric and lactic acids. Thus, in every mass of muscle, we have myriads of electric currents, arising from natural reaction of an acid fluid exterior to the vessels on their alkaline contents. Whatever may be the ultimate destination of this large quantity of electricity, it is at least remarkable that a muscle should be really an electro-genic apparatus. This view of Liebig on the condition of the fluid of muscles, curiously helps in explaining the presence of electricity in them, announced by Matteucci. We have thus two sources of the electricity of muscles—the effects of metamorphosis of effete fibres on the one hand, and on the other, the mutual reaction of two fluids in two different chemical conditions. It is certainly curious thus to find a muscle, an organ long regarded as the motor apparatus of the bony levers of our iron frames, invested with new properties. Its agency in generating electricity can no longer be denied, and I hope, by and by, to render it probable that the seat of generation of animal heat is also in the muscles."—*Lond. Med. Gaz. May*, 1847.

THE CHOLERA,

ITS RELATION WITH ELECTRICITY.

"A report from St. Petersburgh, which we recently noticed, affords a striking confirmation of the views expressed by Dr. Hawthorne, of the pathological nature of cholera, in his very valuable pamphlet. It is stated in the report, that scientific men have, from the outbreak and during the continuance of the disease, noted the remarkable fact of the almost total absence of electricity from the atmosphere, and the almost total deprivation of electric power in those bodies which, ordinarily, are possessed of it in a condensed degree. A magnet, for instance, of forty pounds' sustaining capacity, was found, while the disease was at its height, to be incapable of sustaining more than four or five pounds; and it was further observed that, as the disease seemed to abate, the power of the magnet improved. Now, Dr. Hawthorne bases his views of the pathology and treatment of the disease upon the alleged fact that the body has, by the exciting cause of the disease, not only been deprived of its present stock of electricity, but further, that its electro-producing functions have for the time been suspended, a degree of nervous prostration being thus produced, which is without a parallel in any other known disease. The correctness of these views is fully borne out by these newly observed facts from St. Petersburgh. This

post facto confirmation of the justness of Dr. Hawthorne's doctrine of the nature of the disease accords with the successful results of the reduction of his views to the practical treatment of the disease, results which, to those who were familiar with its otherwise recorded fatalities, were seemingly as incredible as they were undeniable and unprecedented."—*Liverpool Mercury.*

Another very remarkable thing has been noted to me, and I have observed it myself, that there is a very marked diminution in the number of flies. It would seem from this, if it should be found that such is generally the case where the cholera prevails, that the electric deficiency in the air which induces the cholera, is inimical to the vitality of the fly.

There is no longer any doubt but that insect life, and all animal life, depends, for its first impulse as well as continuation, on the electric power. We may form some idea of the wonderful vitalizing power of the electric fluid, from experiments made by Cross, the author of "Vestiges of the Natural History of Creation." This physiologist has produced, by means of a slow galvanic action on a solution of silicate of potass, an insect which has been named after him, the *"Acarus Crossii,"* The same insect has been produced by him in larger numbers in the *ferrocyanate of potass.* The process is detailed at length in the British and Foreign Medical Review, Vol. XIX. p. 170.

It is not to be supposed that these insects are really generated by this process, although such seems to be the insinuation of the author. The experiment shows, however, the astonishing vivifying power of the electro-galvanic fluid. The ova of these acari are, no doubt, floating in the circumambient air, and, notwithstanding the pains taken by Cross to exclude the air, and even to submit the whole process to a boiling heat, it must still be supposed that some air was insinuated during the process, or that the materials themselves which were used contained the rudiments of the insect; and that, notwithstanding the heat to which the process was subjected, these ova were unaffected by it.

I have adduced this case of the *Acarus Crossii* to show how great and wonderful at least, must be the electro-galvanic fluid on the vitality of living beings. Had not this galvanic agent been brought to bear upon those chemical preparations of the potash, those insects would not have been ushered into life. Truly, then, may it be said that the electro-galvanic power is the mighty agent used by the Creator when he calls into life the world of animated being.

From the above facts, I think, it is but reasonable to suppose that the daily use of the Electro-magnetic Machine, during the cholera, would, probably, be an effectual antidote against it.

I hope, also, that the effects of this agent may be tried on those who have already been attacked with the disease. It may prove, in conjunction with other applications, an effectual remedy.

If it were my own case, and I were under the paroxysms of this formidable disease, I would immediately have recourse to my Torpedo Electro-magnetic Machine. I would apply it with a strong power, probably with its full power, all over the body. The positive conductor I would apply to the cervical vertebræ, the back of the neck, and pass

the negative over the abdomen, arms, and legs. I would also pass a light power of the instrument through from the crown of the head to the feet during a few minutes. I would apply the instrument as long as the spasms continued. The whole body and limbs should also, at the same time, be well rubbed with a flannel wet with a stimulating liniment, composed of spirits, camphor, and cayenne.

Should this be tried and prove successful, I would hope, for humanity's sake, that it would, without delay, be made public

I have said that I would use the *Torpedo* Magnetic Machine, not but that other magnetic machines might not answer, but in the *Torpedo* Magnetic Machine I know *how the current runs*, and therefore know *how it should be applied.*

Electricity in the Body in three different states.—"A mass of evidence has been adduced," (says Golding Bird,) "demonstrative of the actual existence of electricity in three different states in the body.

"First. In a state of equilibrium, common to all forms of ponderable matter:

"Second. In a state of tension, capable of acting on the electrometer, giving to the whole body a generally positive condition, and arising, in all probability, from the disturbance of the normal electric equilibrium by the processes of evaporation and respiration:

"Thirdly. In a state of current, a dynamic condition, arising from the disturbance of equilibrium by the union of carbon with oxygen in the capillary system, and from the chemical processes going on in the body: such currents, although suspected to be everywhere existing, having been actually detected between the skin and mucous membrane, the stomach and liver, and the interior and exterior of muscular structures."—*Lond. Med. Gaz. May*, 1847.

The Effect of Rotary Motion on the Magnetic Needle.—"A copper plate, when set in motion, draws around with it the magnetic needle, in a remarkable degree. All metals produce the same effect in a less degree. The needle must be adjusted over it, and near to the surface of the copper. A thin sheet of paper may intervene to prove that the rotation of the needle is not caused by a current of air. This action of the copper is simply consequent upon the electric relations of that metal, and its influence upon the magnet."—*Farraday, in Lond. Med. Gazette, May*, 1845.

Singular Fact in relation to Muscular Electricity.—"Matteucci discovered, by means of the frog-galvanoscope, that the intensity of electric currents in living bodies, rises in proportion to the *rank* occupied by the animal in the scale of being, the duration of the currents after death, being in the inverse ratio."—*Lond. Med. Gazette, April*, 1847.

REMARKS ON ELECTRICITY

MADE BY BRYDONE DURING HIS VISIT TO MOUNT ÆTNA.

"Perhaps, of all the reasons that is assigned for the wonderful vegetation that is performed on Mount Ætna, there is in fact none that contributes so much towards it, as this constant electrical state of the air: For, from a variety of experiments, it has been found that an increase of the electrical matter increases the progress of all vegetation. It probably acts there in the same manner as on the animal body;—the circulation, we know, is performed quicker, and the juices are driven through the small vessels with more ease and celerity. This has often been proved from the immediate removal of obstructions by electricity;—and probably, the rubbing with dry and warm flannel, esteemed so efficacious in these cases, is doing nothing more than exciting a greater degree of electricity in the part; but it has likewise been demonstrated by the common experiment of making water drop through a small capillary siphon, which, the moment it is electrified, runs in a full stream. I have, indeed, very little doubt, that the fertility of our seasons depends as much on this quality of the air, as either on its heat or moisture.

"Electricity will, probably, soon be considered as the great vivifying principle of nature, by which, she carries on most of her operations. It is a fifth element, perfectly distinct, and of a superior nature to the other four, which only compose the corporeal parts of matter: But this subtile and active fluid is a kind of soul that pervades and quickens every particle of it. When an equal quantity of this is diffused through the air, and over the face of the earth, every thing continues calm and quiet; but, if by any accident, one part of matter has acquired a greater quantity than another, the most dreadful consequences often ensue before the equilibrium can be restored—nature seems to fall into convulsions, and many of her works are destroyed;—all the great phenomena are produced; thunder, lightning, earthquakes, and whirlwinds: for, I believe, there is little doubt, that all these often depend on this sole cause. And again, if we look down from the sublime of nature to its minutiæ, we shall still find the same power acting, though perhaps, in less ligible characters; for as the knowledge of its operations is as yet in its infancy, they are generally misunderstood or ascribed to some other cause. However, I have no doubt, that in process of time, these will be properly investigated when mankind will wonder how much they have been in the dark. It will then, possibly, be found, that what we call sensibility of nerves, and many of those diseases that the faculty have as yet only invented names for, are owing to the body being possessed of too large or too small a quantity of this subtile and active fluid; that very fluid, perhaps, that is the vehicle of all feelings, and which they have so long searched for in vain in the nerves: for I have sometimes been led to think that this sense was nothing else than a slight kind of electric effect, to which, the nerves serve as conductors, and that it is by the rapid circulation

of this penetrating and animating fire that our sensations are performed. We all know, that in damp and hazy weather, when it seems to be blunted and absorbed by the humidity, when its activity is lost and little or none of it can be collected, we ever find our spirits more languid, and our sensibility less acute: but in the Sirocco wind at Naples, when the air seems totally deprived of it, the whole system is unstrung and the nerves seem to lose their tension and elasticity, till the north or west wind awakens the activity of this animating power, which soon restores the tone and enlivens all nature, which seemed to droop and languish during its absence.

"It is likewise well known, that there has been instances of the human body becoming electric without the mediation of any electric substance, and even emitting sparks of fire, with a disagreeable sensation and even an extreme degree of nervous sensibility.

"About seven or eight years ago, a lady in Switzerland was affected in this manner, but I was not able to learn all the particulars of her case; however, several Swiss gentlemen have confirmed to me the truth of the story. She was uncommonly susceptible of every change of weather, and had her electrical feelings strongest in a clear day, or during the passage of thunder-clouds, when the air is known to be replete with that fluid. Her disease, like all others which the doctors can make nothing of, was decided to be a nervous one, for the real signification of these words I take to be only that the physician does not understand what it is.

"Two gentlemen of Geneva had a short experience of the same sort of complaint, though still in a much superior degree. Professor Saussure and young Mr. Jalabert, when travelling over one of the high Alps, were caught amongst thunder-clouds, and, to their astonishment, found their bodies so full of electrical fire, that spontaneous flashes darted from their fingers with a crackling noise and the same kind of sensation as when strongly electrified by art. This was communicated by Mr. Jalabert to the Academy of Sciences at Paris, I think in the year 1763; and you will find it recorded in their memoirs.

"It seems pretty evident, I think, that these feelings were owing to the bodies being possessed of too great a share of electric fire. This is a very uncommon case, but I do not think it at all improbable, that many of our invalids, particularly the hypochondriac people, and those we call *Malades Imaginaires*, owe their disagreeable feelings to the opposite cause, or the bodies being possessed of too small a quantity of this fire, for we find that a diminution of it in the air seldom fails to increase these feelings, and *vice versa*.

"Perhaps it might be of service to those people to wear some electric substance next their skin to defend the nerves and fibres from the non-electric air. I would propose a waistcoat of the finest flannel which should be kept perfectly clean and dry; for the effluvia of the body, in case of any violent perspiration, will soon destroy its electric quality: this should be immediately covered by another of the same size of silk but without being sewed together; the animal heat and the friction that exercise must occasion betwixt these two substances, produce a powerful electricity, and would form a kind of electric at-

mosphere around the body, that might, possibly, be one of the best preservatives against the effect of damps."—*Tour through Sicily and Malta*, p. 111.

"So highly electric is the vapor of volcanos, that it has been observed in some eruptions both of Ætna and Vesusius, that the whole track of smoke, which sometimes extended for upwards of 100 miles, produced the most dreadful effects; killing shepherds and flocks on the mountains; blasting trees, and setting fire to houses, wherever it met with them on an elevated situation. These effects, however, only happen when the air is dry and little agitated; but when it is full of moist vapor, the great rarefaction from the heat of the lava generally brings it down in violent torrents of rain, which soon conveys the electrical matter from the clouds to the earth, and restores the equilibrium."—*Ibid.* p. 117.

This same author remarks, that "during the prevalence of the Sirocco wind at Naples, the electricity in the air seems to be almost totally annihilated, or, at least, its activity exceedingly reduced. This wind gives a degree of lassitude both to the body and mind, that renders them absolutely incapable of performing their usual functions. All works of genius are laid aside during its continuance; and when any thing very flat or insipid is produced, the strongest phrase of disapprobation they can bestow is, "*Era scritto in tempo del Sirocco;*" that is, it was written in the time of the Sirocco."—*Ibid.* p. 4.

DIFFERENT DIRECTIONS OF THE ELECTRIC CURRENT PRODUCE DIFFERENT EFFECTS.

"It seems quite certain," (says Golding Bird,) "that, *cæteris paribus*, nerves only convey the influence of a current in a given and definite direction, and, that a mixed nerve of sensation and voluntary motion will only obey the stimulus of the electricity to excite contractions when acted upon by a direct current,—an indirect current exciting only painful sensations and no motion.

"If in a living frog the legs be separated from the trunk by the division of all intervening structure except the sciatic nerves, by which communication is kept up between the several portions, and a current be transmitted, very instructive results, bearing upon these facts, are observed. For when a direct current is allowed to traverse the body of the animal, along the nerves to the legs, violent convulsions occur, whilst if the direction of it be reversed, no motion whatever occurs, but the frog will express its senses of pain by audible croaking. The application of the galvanic stimulus thus lends much support to the opinion of the really double structure of the so-called nerves of sensation and voluntary motion, for we have seen that when travelling in the direction of the ramification of the nerves, a centrifugal motion is excited, and, when in the opposite direction, a centripetal sensation is also excited, and not the slightest motion occurs if all communication with the spine is cut off; a fact which admits of a ready explanation by the views of Dr. Marshal Hall, to whose patience, ingenuity, and

talent, this portion of Physiology stands deeply indebted. Matteucci and Langet have shown that these effects of electricity may be conveniently applied to test the nature of a particular nerve, as far as its motion and sensitive function is concerned, for if a current of low tension traverse a spinal nerve after the careful division of its anterior root, not the slightest motion ensues, whilst if the other root only were divided, contractions would instantly occur.

"When a current is allowed to act upon a nerve of special sense, it seems simply to produce the effect of exciting these proper functions. Thus, if the wires conveying a current, be allowed to pass from one ear to the other, a loud noise is audible; if through the eyes, flashes of light are seen; if the tongue, an acrid taste, &c. According to Grapengisser, these results are always best noticed when the positive current enters—the loudest sound is heard; whilst on breaking connection with the battery, the sound is most audible in the other ear: just what might have been expected from the observations already made on the action of currents on nerves. It must not be supposed that the feeble currents of electricity we have employed are alone active on frogs, for effects sufficiently energetic are produced by them on warm-blooded animals, and I hope to produce evidence, when speaking of the medical application of these agents, to show that important remedial effects may be thus developed: I shall now content myself by adducing one or two recorded facts in illustration of this position.

"Aldini placed a zinc plate in the mouth of a recently killed ox and a piece of silver in the anus; on connecting them with a piece of wire, the abdominal muscles were convulsed, and a discharge of fæces occurred; this curious experiment was repeated by Arehard of Berlin, on himself; he experienced, almost immediately, pain in the pelvis, and soon after the contents of the bowels escaped. Humboldt tried this experiment with a linnet, which was lying on its back exhausted, and, in fact, dying; no result occurred until the metal placed in its beak was connected with that in the anus, when, in an instant, the bird appeared to be resuscitated,—it opened its eyes, stood up, flapped its wings, breathed for eight minutes, and then quietly died. He then tried an experiment on himself, by blistering a small surface over both deltoid muscles, placing on the raw surface plates of zinc and silver. On connecting the metals with a conductor, a distinct shock and a contraction of the muscles was felt, followed soon by others rather weaker. He also observed that the blister to which the silver was applied soon healed up, whilst that to which the zinc was applied discharged for a long time, and, if previous nearly dry before the application of the zinc, had its discharge renewed. I shall have occasion soon to allude to some very remarkable consequences I lately observed on repeating this experiment on some patients in the wards of the hospital."—*Lond. Med. Gaz.*

INSTANTANEOUS MOXA PRODUCED BY GALVANISM.

"M. Fabré Palaprat produces by means of galvanism, an instantaneous moxa, in the most deep-seated regions of the body, without

appreciable lesions, except in the parts to which it is applied. For this purpose, he introduces into the part affected a platinum needle, which he places in communication with one pole of a pile composed of large plates capable of producing thermo-electric effects, while the other pole is brought into connection with some neighboring part of the body by means of a metallic plate. At the moment when the communication between the poles is established, the needle becomes incandescent, and burns the contiguous flesh, producing intense pain, but of very short duration. Inflammation sets in after a few days, resembling that produced by moxa; an eschar ensues, and a pipe of destroyed flesh, resembling a quill at length falls out."—*Becquerel*, Vol. IV. p. 306.

THE ELECTRO-BIOLOGICAL CIRCUIT

EXEMPLIFIED IN THE BODY OF A BICEPHALOUS CHILD.

The account is by John Wickens West, M. R. C. S. L. A. C., &c.

"The subject was a double-headed child, of the ordinary size and weight, of the female sex, living, and apparently well formed in every other particular. The second head, as large as the natural one, was attached to the part of the spine of the child occupied by the two inferior cervical and two superior dorsal vertebræ, which, on minute examination, I discovered to be deficient; it was well formed, had eyes, nose, and mouth fully and naturally developed; but the ears were absent. The child lived four hours. The second head presented *no sign of animation*. The function of respiration, during the period of its existence until a few minutes of its death, was naturally performed." *Lond. Med. Gaz., May*, 1845.

In the above case, the "*second head presented no sign of animation.*" According to the theory of the Electro-biological circuit, as described in this work, more than one head could not have presented signs of animation, or at least, not with the characteristics of a head. If it had been possible for the head to live, none of the mental faculties could have been exercised by it; because as the entire body with the brain performs its functions precisely on the principles of the Votaic battery, and as the brain is one of the poles of that great battery, more than one head and one brain could not be the pole to that battery, no more than there could be more than one negative pole to any other Voltaic or Galvanic battery.

There are, indeed, acting within this great and general Voltaic battery of the human system, many others, working, as it were in miniature, each with its negative and positive pole; each working its own office, but they do not constitute the general Electro-biological circuit of which the brain is one of the poles.

ELECTRO-CHEMICAL DECOMPOSITION,

THE POLES OF THE BATTERY, AND DEFINITION OF TERMS RELATIVE THERETO.

According to Faraday,* electro-chemical decomposition is occasioned by an internal corpuscular action, exerted according to the direction of the electric current, and is due to a force superadded to, or giving a direction to the ordinary chemical affinity of the bodies present. He conceives the effects to arise from forces which are internal, relative to the matter under decomposition, and not external, as they might be considered, if directly dependent upon the poles. He supposes the effects are due to a modification, by the electric current, of the chemical affinity of the particles through or by which that current is passing, giving them the power of acting more forcibly in one direction than in another, and consequently making them travel, by a series of decompositions and recompositions, in opposite directions, and finally causing their expulsion or exclusion at the boundaries of the body under decomposition, in the direction of the current, and that in larger or smaller quantities according as the current is more or less powerful.

The electric current is looked upon by Faraday as an axis of power, having contrary forces, exactly equal in amount, in contrary directions.

What are called the poles of the Voltaic battery are merely the surfaces or doors by which the electricity enters into or passes out of, the substance suffering decomposition; Faraday hence proposes for them the term *electrodes*, meaning thereby, the substance, or surface, whether of air, water, metal, or any other substance which serves to convey an electric current into, and from the decomposing matter, and which bounds its extent in that direction. The surfaces at which the electric current enters, and leaves a decomposing body, he calls the *anode* and the *cathode;* from two compound Greek words, signifying the way the sun rises, and the way the sun sets, the idea being taken from the earth, the magnetism of which is supposed to be due to electric currents passing around it in a constant direction from east to west. The anode is, therefore, the surface at which the electric surrent enters; it is the negative extremity of the decomposing body; is where oxygen, chlorine, acid, &c., are evolved, and is against or opposite the positive electrode.

The cathode is that surface at which the current leaves the decomposed body, and is its positive extremity: the combustible bodies, metals, alkalies, and bases are evolved there, and it is in contact with the negative electrode.

Compounds directly decomposable by the electric current, are called *electrolytes*, from a Greek word, signifying to *set free*. To electrolyze a body is to decompose it electro-chemically. The elements of an electrolyte are termed *iöns*, from the Greek verb *to go* or *going: anions* are the *iöns* which make their appearance at the anode, and were formerly termed the electro-negative elements of the compound,

* Experimental Researches, 518, 524.

and *cations* are the *ions* which make their appearance at the cathode, and were termed the electro-positive elements. Thus, chloride of lead is an electrolyte, and when *electrolyzed* evolves two *ions*, chlorine and lead, the former being an anion, and the latter a cation: water is an electrolyte, evolving likewise two *ions*, of which oxygen is the anion, and hydrogen, the cation; muriatic acid is likewise electrolytical, boracic acid on the other hand, is not.

One essential condition of electrolyses is liquidity; and the current of a powerful battery will be completely stopped by a film of ice, not more than one-sixteenth of an inch in thickness.

THE PHENOMENON OF SPRINGS

EXPLAINED ON ELECTRIC PRINCIPLES.

Crosse, the author of a work entitled "*The Vestiges of the Natural History of Creation*," has imitated, in a most extraordinary manner, *constant* and *intermittent* springs with the acid of the Voltaic battery. The experiments were made in the following manner:

"First. A common garden-pot full of moistened pipe-clay was placed in a basin full of water: a platinum wire connected with the negative extremity of a sulphate of copper battery, of twelve pairs of plates, each two inches long, by one inch wide, was placed three inches deep into the middle of the clay; and a second platinum wire connected with the positive pole, was plunged into the water in the basin, to the same depth. Within a fortnight *fissures* took place in the clay in contact with the negative wire; in six or eight weeks, these fissures filled with water, which was drawn up two inches above the level of the water in the basin. A small pool of water was formed round the negative wire, which at last overflowed and trickled constantly into the basin below. Here, then, was a constant electrical spring.

"Secondly. Here the experiment was varied; but the apparatus was precisely similar. In this, both wires were plunged three inches deep into the same pot of moist pipe-clay, at the opposite sides, but about three-quarters of an inch from each side. Within a fortnight, fissures took place at the negative, but none at the positive wire. In a month or six weeks more, these fissures filled with water which overflowed, and after a day or two *ebbed*, and then again overflowed, and so on, being apparently acted on by change of weather. He generally found the spring overflowing when the barometer was *very low*; and the reverse, when it was *high*. Here, then, was an electrical intermittent spring.

"In subsequent experiments, he found it better to employ porous earthen-pots, open at the top and bottom, filled within an inch of the top with pipe-clay kneaded with water to the consistence of putty, and plunged into a basin; three platinum wires issuing from one stout wire connected with the negative extremity of the battery, being plunged three inches deep into the clay; and a group of six platinum wires issuing from one connected with the positive pole, being immersed to

the same depth in the water. With this arrangement, if the battery is active, the water will rise in one night half an inch above the surface of the clay in the pot, the lip of which, together with the whole rim, to the depth of an inch, is glazed. Under the lip is placed a shoot of sheet copper, to convey the water, as it falls drop by drop from the lip, to a graduated glass vessel. In one experiment, he mixed dilute sulphuric acid with the pipe-clay, instead of distilled water, *Not one drop of water was raised upwards to the negative wire;* but the water in the basin, which was also acidulated with the same acid, was changed to a most beautiful *rose-red*. In a letter received from him, addressed to the author, in the beginning of the year 1840, he says, "'My two springs—the one constant, the other intermittent—are in as good action as ever. The intermittent overflows generally when the barometer is somewhat below 29°; and is generally dry when the barometer is above that point. A row of open porous pitchers being filled with pipe-clay, all their lips turned the same way and all negatively electrified, may yield a succession of drops, which being collected in a shoot, may be used to turn a small water-wheel, thus producing perpetual motion; and provided the power be found equivalent to produce such increased effect, it may be applied in the most important ways. Also, the fissures formed in the clay at the negative pole, may be converted into metallic lodes, by mineralizing the water in the basin with metallic and other solutions:—this I have already done.'"

Electrical Light and Taste.—The simple application of a piece of zinc and one of silver to the tongue and lips, frequently gives rise, at the moment of the contact of the metals, to the perception of a luminous flash; but the most certain way of obtaining this result, is to press a piece of silver as high as possible between the upper lip and the gums, and to insert a silver probe into the nostrils, while at the same time a piece of zinc is laid upon the tongue, and then to bring the two metals in contact. This phenomenon is evidently produced by an impression communicated to the retina or optic nerve, and is analogous to the effect of a blow on the eye, which is well known to occasion a sensation of a bright luminous coruscation, totally independent of the actual presence of light. In like manner the flash from galvanism is felt, whether the eyes are open or closed, or whether the experiment is made in the day-light or in the dark. If the pupil of the eye is watched by another person, it will be seen to contract at the moment the metals are brought into contact; a flash is also perceived the moment the metals are separated from each other.

When different metals are applied to different parts of the tongue, a peculiar taste is perceived: in order that this experiment should succeed, it is necessary that the tongue should be moist. The quality of the metal laid upon the tongue influences the kind of taste which is communicated; the more oxidable metal giving rise to an acid, and the less oxidable metal to a distinct alkaline taste. Similar differences have been observed by Berzelius, with regard to the sensations excited in the tongue, by common electricity, directed in a stream upon that

organ from a pointed conductor; the taste of positive electricity being acid, and that of negative electricity, caustic and alkaline.

THE VELOCITY OF ELECTRICITY.

The velocity of electricity is so great that the most rapid motion that can be produced by art, appears to be actual rest when compared with it. A wheel revolving with a rapidity sufficient to render its spokes invisible, when illuminated by a flash of lightning, is seen for an instant with all its spokes distinct, as if it were in a state of absolute repose; because, however rapid the rotation may be, the light has come and already ceased before the wheel has had time to turn through a sensible space.

"The following beautiful experiment was made by Wheatstone:—A circular piece of pasteboard was divided into three sections, one of which was painted blue, another yellow, and a third red; on causing the disc to revolve rapidly, it appeared white, because a sunbeam consists of a mixture of these colors, and the rapidity of the motion caused the distinction of colors to be lost to the eye; but the instant the pasteboard was illuminated by the electric spark, it seemed to stand still, and each color was as distinct as if the disc were at rest

By a beautiful application of this principle, Wheatstone contrived an apparatus by which he has demonstrated that the light of the electric discharge does not last the millionth part of a second of time. His plan was to view the image of a spark reflected from a plane mirror, which, by means of a train of wheels, was kept in rapid rotation on a horizontal axis. The number of revolutions performed by the mirror was ascertained by means of the sound of a siren connected with it, and still more successfully by that of an arm striking against a card, to be 800 in a second. The angular motion of the image being twice as great as that of the mirror, it was easy to compute the interval of time occupied by the light during its appearance in two successive points of its apparent path, when thus viewed, it was ascertained that the image passed over half a degree (an angle, which being equal to about an inch seen at the distance of ten feet, is easily detected by the eye) in 1,152,000th part of a second. The result of these experiments, as regarded the duration of the spark, was, that it did not occupy even this minute portion of time: but when the electric discharge of a battery was made to pass through a copper wire of half a mile in length, interrupted both in the middle and also at its two extremities; so as to present three sparks, they each gave a spectrum considerably elongated, and indicating a duration of the spark of the 24,000th part of a second. The sparks at both extremities of the circuit were perfectly simultaneous, both in their period of commencement and termination; but that which took place in the middle of the circuit, though of equal duration with the former, occurred later by at least the millionth part of a second, indicating a velocity of transmission from the former point to the latter of nearly 288,000 miles in a second,—a velocity which exceeds that of light itself.

Variations of the Electric State of the Atmosphere.—It it confirmed by the observations of all electricians, that in serene weather the electricity of the atmosphere is always positive with regard to the earth, and that it becomes more and more positive in proportion to its elevation above the earth's surface. It has further been ascertained by the observations of De Saussure, Schubler, Arago, and others, that the positive electricity of the atmosphere is subject to diurnal variations of intensity, there being two maxima and two minima during the twenty-four hours. The first minimum takes place a little before the rising of the sun: as it rises, the intensity at first gradually and then rapidly increases, and arrives at its first maximum a few hours after. This excess diminishes at first rapidly, and aftewards slowly, and arrives at its minimum some hours before sunset; it re-ascends when the sun approaches the horizon, and attains its second maximum a few hours after, then diminishes till sunrise, and proceeds in the order already indicated. The intensity of the free electricity of the atmosphere has also been found to undergo annual changes, increasing from the month of July to the month of November inclusive, so that the greatest intensity occurs in winter, and least in summer.

EFFECTS OF GALVANISM ON THE DEAD BODY.

"The results of a series of Galvanic experiments, performed on the body of Clydesdale, who was executed at Glasgow, for murder, led the medical gentlemen present to infer, that, if certain precautions had been taken, resuscitation would have been accomplished, although the body had been suspended the usual period at the gallows, and much time afterwards occupied in preparatory arrangements for the Galvanic process. 'An incision was made into the nape of the neck, close below the *occiput*. The posterior half of the *atlas vertebræ* was then removed by bone forceps, when the spinal marrow was brought into view. A profuse flow of liquid blood gushed from the wound, inundating the floor.' These and several unnecessary wounds were made in various other parts of the subject, which rendered resuscitation impossible, with whatever judgment the galvanic stimulus had been subsequently applied. But, notwithstanding the severe laceration of the spinal marrow, and almost total evacuation of blood from the body, even half an hour subsequently, a most interesting effect was produced. When one of the conducting wires was placed in an incision under the cartilage of the seventh rib, and the other applied to the phrenic nerve laid bare in the neck, having one of the conductors in permanent connection with the battery, and the other run over the tops of the plates, 'Full, nay, laborious breathing instantly commenced. The chest heaved and fell; the belly was protruded, and again collapsed, with the relaxing and retiring diaphragm;' which was continued, uninterruptedly, during the whole time this galvanic process was carried on.

"The most successful Galvanic experiments on the human subject, were made on the body of John White, who was executed for murder, at Louisville, United States. The neck was not broken, and the body

warm, even trembling, having hung only about twenty-five minutes. "'The poles of a powerful galvanic pile, prepared for the occasion, were immediately applied to him. He suddenly arose from his bench to a sitting posture. He soon afterwards rose upon his feet, opened his eyes, and gave a terrific screech. His chest worked as if in respiration. One of the surgeons exclaimed, to the mute spectators, that he was alive. While thus standing, another galvanic discharge was administered, when White, with a sudden bound, disengaged himself from the wires and jumped to a corner of the room. Some short time afterwards he frequently opened his eyes, and his breathing became so regular, that the doctors began to speak to him, but he heard not a word; nevertheless, by the assistance of a young medical student, who took hold hold of his arm, he arose, took a few steps on the floor, and seated himself in an arm-chair. He appeared overcome with the exertion thus made, but was revived by hartshorn applied to the nose He looked like a man much intoxicated. He seemed to try to give utterance to some feelings, but he could not speak a word. Though now perfectly resuscitated, and every method resorted to for the purpose of equalizing the circulation, and save the patient, congestion on the brain, which increased with rapidity, shortly afterwards terminated his existence.'

"The phenomenon developed in these two cases, are of the highest importance in medical science; for, notwithstanding the want of success in resuscitating Clydesdale, and the eventual loss of White, there appear sufficient reasons for supposing, that both events were the natural consequences of the circumstances connected with the cases. In the former case resuscitation was impossible, for reasons already alluded to; and the fatal congestion which terminated the existence of White, was referrable to the violence of strangulation, and not easily traced to any other cause, excepting, however, the possibility of the Galvanic discharges being too powerful, and injudiciously directed. A powerful battery is never required for any medical purpose whatever, and may, by an injudicious application of its force, be the means of very serious consequences; whilst a battery of moderate power and properly employed, in similar cases, would be productive of the happiest effects. The battery employed on the body of Clydesdale, which consisted of 270 pairs of four-inch plates, brought into intense action by a solution of nitro-sulphuric acid, was far too powerful for purposes of this kind. As a few powerful discharges, or a continuous current of a few minutes' duration, hasten the extinction of vitality in those animals whose natural functions have been intentionally prostrated and laid dormant, for the purpose of experiment; and although a battery of fifty pairs, which would produce this effect on a rabbit, but not on a muscular man, that which was employed in the experiments on Clydesdale would be capable of subduing the vital energies, which remain after strangulation, even of an individual whose physical developments of organism were of the highest order in nature.

"The tumefaction and lividity of the face, produced by strangulation at the gallows, enforce a strong probability that in no case of that kind would the natural functions of life be recalled into a naural state of activity, by the Galvanic influence."—*Annals of Electricity*, vol. vii.

Electroscope.—"By the aid of an Electroscope we are enabled to ascertain the different electric states of substances with great precision. For instance, we can detect the different electrical states of the inside and outside of various articles of clothing. A person's coat, when pulled off after a smart walk, is always highly electrical; having the inside and outside in different states."—*Sturgeon's Galv.* p. 81.

The Vital Electric Action on Different Animals.—"In the human Bio-Voltaic battery the completion of the circuit is through certain Dynamic nerves, which passing through to the flesh, produces Motion—to the electric batteries of certain fishes, produces Electricity—to the light-generating apparatus of animals, produces Light. Besides these forces, more or less heat is produced in most creatures."—*Smee*, p. 49.

Different Polarities in the same Metal.—"Even one and the self-same mass of an individual metal, is electro-polar on its opposite surfaces, when not of the same degree of polish or texture."—*Sturgeon's Galv.* p. 70.

"Place a zinc plate on a sheet of glass, and a copper plate on the zinc. In this place the copper is negative and the zinc positive."—*Ibid.* p. 70.

An Experiment showing the Polarity of a Dry Pile.—"Let the Pile be placed on two gold-leaf electroscopes, having one pole on each—both pairs of gold-leaf diverge, and to about the same extent. We now remove the pile by taking hold of the middle of the glass tube. The diverging continues, and by testing with excited sealing-wax, or by glass, we find one of the electroscopes to be electro-positive, and the other electro-negative."—*Ibid*, p. 75.

The Electric Current from the Feet to the Head.—"It is remarkable," (says Golding Bird,) "that in the batrachians generally, especially in the frog, proper electrical currents are detected capable of deviating the needle of the galvanometer to 5°. Its direction is always definite, from the feet to the head. This curious and remarkable fact was, I believe, first pointed out by Nobili, but accurately studied by Matteucci, to whose researches I have so often referred."—*Bird in Lond. Med. Gaz. April*, 1847.

The Preferability of Electro-magnetism to Galvanism.—"There are," (says Golding Bird,) "many serious inconveniences attending the use of Galvanic electricity, and not the least of these is the bulky and unmanageable form of apparatus required for its excitation in a state of even moderate tension. On this account, this form of electricity is now seldom employed, and in my own practice I confess I never use it; for the electricity of dynamic induction is so much easier excited, and, being the same in essence, has always been, so far as my own experience has extended, substituted for it,"—*Lond. Med. Gaz. June*, 1847.

"Muscular Contraction ensues from the material existing in the ultimate fibre being increassed in bulk by changes taking place in consequence of the Voltaic circuit."—*Smee*, p. 51.

ELECTRO-MAGNETISM MEDICALLY APPLIED.

Before entering directly on to the subject of the Medical Application of Electro-magnetism, I have, as the reader will perceive, devoted a few pages to the subject, which may not, at first, appear to bear directly on the Medical Application of Electro-magnetism, but which, nevertheless, I think, will throw considerable light upon it. The fact is, the cures effected by Electro-magnetism, and Galvanism, are so wonderful, and effected, in some instances, so suddenly, that, unless the mind is somewhat prepared for the reception of such facts they would, perhaps, be doubted. Electricity and Magnetism, are certainly the most wonderful powers, or, perhaps to speak more properly, the most wonderful power, of which we have any knowledge. I think it may, with truth be said to be the agent which the Creator uses in the manifestation and support both of animal and vegetable life, and the principle upon which most of the phenomena of nature depend. By the power of this subtle and universal agent all the heavenly bodies are put and kept in motion, and governed in their motions by its attracting and repelling force.

It is by this mysterious power that the human mind takes cognizance of the exterior things of creation. It is upon this stream that she sails out upon the wide ocean of space, and scans its broad scope by the construction of instruments, by the aid of which, she sounds the depths of the universe, measures the distances and the magnitude of the heavenly bodies, determines their velocity, and accurately points out their oscillations, aberrations, and various other laws by which they are governed.

We come now to this same power as a curative agent. It has already been stated that there are different kinds of electricity; frictional, animal, hydro, thermo, Voltaic, and Electro-magnetic. Of these we shall treat more particularly on the two last, and especially on that of Electro magnetism.

It has been shown that the human body acts on the principle of the galvanic battery;* that in the electro-biological circuit of this body, the brain constitutes the great negative pole, and the membranes, tissues, fluids, and serous surfaces, of the rest of the body, the positive pole.† So long therefore, as the integrity of this circuit is maintained health will be enjoyed, and disease is the consequence of its derangement.

It has also been shown that the nervous and electric fluid perform the same functions in the animal body.‡ I think there can be no reasonable doubt but that they are the same subtle fluid under different modifications. The experiment made by Dr. Wilson Philip clearly shows that the function of digestion can be performed by the Electro-magnetic fluid as well or nearly as well as by the nervous fluid;§ we have therefore good reason for supposing, that, whenever, in any part of the body, there is a deficiency of nervous energy, and consequently derangement of health, that there the Electro-magnetic fluid by re-

* p. 9. † p. 4. ‡ p. 13. § p. 13.

storing the vital action in the nerves, would restore the health. This result we should reasonably look for unless there should be some persistent cause for the derangement of the vital function; in which case, such cause would neccessarily have to be removed before the remedy could be expected to succeed. If, for instance, the derangement of health arose from some habitual excess in eating, drinking, or in any other way, it could not be expected that the remedy would succeed, so long as the approximate cause of the disease still remained, because as fast as Electro-magnetism would restore the nervous energy, it would be drained off by the breach made by the cause of the disease still acting; just the same as a pipe open at both ends could not be made to contain the water poured into it.

We have seen that if a sponge, saturated with water, be suspended from the prime conductor of an electrical machine, the water, when the machine is first worked, will drop slowly from it; but when the conductor becomes powerfully electrified, it will descend abundantly; and, in the dark will exhibit the appearance of a shower of luminous rain.* Electro-magnetism, acting upon the body on the same principle, produces parallel effects. That is, it causes a dilatation in all the capillaries whereby the secretory and excretory functions are excited; hence, we find that when the Electro-magnetic Machine is applied, the skin becomes moist and not unfrequently the perspiration is considerable. The kidneys also being excited and the bowels, we find that both the urinary and alvine discharges are accelerated, If the conducting wires of the Electro-magnetic Machine be properly applied, the bowels can generally be made to discharge the fæces forthwith. In like manner, when properly applied to the bladder and kidneys, the urinary discharge can also be promptly effected.

When Electro-magnetism is applied with a very gentle power, one conductor to the head and the other to the feet, it acts as an *Anodyne*. The sensation produced is very soothing to the nervous system, and the sleep it induces is refreshing.

As an *Emollient* its effects are very marked. I have seen it reduce swellings of a considerable size, one half, by a single application. It has removed large indurated tumors of near thirty years standing in a few days. The reduction is sometimes effected by the suppuration, and sometimes by the resolution of the tumor. It seems to effect the reduction of tumors by imparting an increased vital energy to the nerves, by dilating the capillaries, and by chemically aiding the nervous fluid in dissolving and forcing out the effete matter which clogs the vessels in the tumor. While these effects are taking place the parts through which the Electro-magnetic current is made to pass are seen to be in a constant tremulous motion. This is caused by the vessels contracting and expanding as the current is alternately broken and connected again. This continued contraction and expansion aids greatly in reducing the swelling. In fact, it acts as a kind of forcing pump, or press to squeeze out the effete obstructions, either into the

* p 27.

general circulation, to be thrown off by the excretory vessels, or it promotes the discharge by forming an abcess.

As an *Alterative* it stands unrivalled, especially, when applied in a general manner from the head to the feet, and particularly on the region of the stomach and abdomen.

As an *Emmenagogue* there is nothing to be compared with it. Dr. Golding Bird, affirms that it is "the only direct emmenagogue which the experience of our profession has furnished. I do not think I have ever known it fail to excite menstruation, where the uterus was capable of performing this office."—*Medical Gazette, June,* 1847.

In *Parturition,* when there are protracted feeble labor pains, this agent is found to be of great value, aiding, by its proper application the efforts of nature to discharge the fœtus.

In uterine *Hemorrhages,* which sometimes are so alarming during this period, the application of Electro-Magnetism has been found to give immediate relief.

In treating on the manner of applying galvanism and Electro-magnetism in the treatment of disease, I shall avail myself of information derived from Medical and Scientific Journals, and from the experience of those who have been using these agents successfully. Although, myself, principally engaged in the manufacture of the Electro-magnetic Machines, I have, nevertheless, for near five years, devoted much attention to the manner of applying them. Some of those who are now using the Torpedo Magnetic Machines according to the instructions I gave them, are effecting many and great cures. I would, however, observe that the most skilful in the use of Electro-magnetism, may be said, comparatively, to be still novices in the art. Electro-magnetism is an agent but recently introduced into medical practice, so recent, that, until within a very few years, such an instrument as an Electro-magnetic Machine was not to be found in any part of the United States. Now, on the contrary, it is an auxiliary to the medical profession, which, with many is considered indispensable. The fact is, there seems now to be a kind of necessity that every physician should have a magnetic machine. The people are becoming daily, more and more convinced of the efficacy of these machines, and a physician who is not in possession of one, and who does not use one becomes unpopular. I could name more than one individual, no graduate of any medical college, who, merely by their own good judgment, and by the instructions which I have imparted to them in using the Torpedo Magnetic Machine, have now a very extensive run of practice.

There is one person in particular, in this city, who is using the Torpedo Electro-magnetic Machine with such success, that patients come to him to be operated on from the distance of hundreds of miles, and from different States. I have frequently been in his office, and never, to my recollection, have I found him without a patient in the chair, and without others waiting their turn. Some of them have told me that they had been waiting five hours for their turn. I have seen there the blind restored to sight. I have known of others who had not been able to walk for years, to throw away

their crutches, and to be restored to the perfect use of their limbs, and others cured of various complaints, after having been pronounced incurable by their regular physician, and given up as hopeless. I will state that the individual alluded to is Dr. William Miller, No. 346 Broome St.

These cures are all effected by the use of the Torpedo Magnetic Machine, very seldom any other medicine being used with it.

DR. GOLDING BIRD,

ON ELECTRICITY AND ELECTRO-MAGNETISM.

I avail myself of the testimony of one so universally celebrated for his medical talent, in favor of the subject on which I am treating, because the circumstances in which he was placed, gave him every opportunity of becoming fully acquainted with the subject.

His being the presiding physician over so celebrated an institution as Guy's Hospital in London, will, I presume, be a sufficient recommendation for his opinion on subjects connected with the healing art. In reference to his employment in the hospital he writes as follows:—"In the autumn of 1836, the authorities of the hospital thought fit to set apart a room for the administration of electricity. Clinical clerks were appointed to record the cases, and the whole was placed under my control, and remained in my hands during eight years."—*London Med. Gaz.* 1847.

"I purpose next," (continues he) "to direct attention to the results which have followed the employment of the different modifications of electricity in the treatment of disease. In doing this, I do not intend to occupy your time by a tedious reference to all that has been previously published on this subject in this country and on the continent. Such records are familiar to every physician, and within the reach of every body who will take the trouble of referring to them. I am more anxious to avail myself of this opportunity of presenting to the members of the College the results which have fallen under my own personal experience.

"Electricity has been by no means fairly treated as a therapeutical agent, for it has either been exclusively referred to when all other remedies have failed,—in fact, often exclusively, or nearly so, in hopeless cases,—or its administration has been carelessly directed, and the mandate, 'Let the patient be electrified,' merely given, without reference to the manner, form, or mode of the remedy being for an instant taken into consideration.

"Conscientiously convinced that the agent in question is a no less energetic than valuable remedy in the treatment of disease, I feel most anxious to press its employment upon the practical physician, and to urge him to have recourse to it as a rational but fallible remedy, and not to regard it as one either expected or capable of effecting impossibilities; I again say, I shall advance nothing but what has been repeatedly tested under my own observation, purposing to lay before

you the results of many years' careful clinical experience in this matter in the wards of Guy's Hospital, and hope to make out a strong case in favor of this too much neglected remedy.—*Ibid.* 1847.

MANNER OF RUNNING THE MACHINE.

The Instrument, when running, is to be taken from the bottom of the rose-wood case, and placed on the two little projecting pieces which are fastened on the inside of the case, near the top; the side of the instrument where the three posts are, is to be placed adjoining the battery or copper box, as it stands in the rose-wood case. The instrument is then to be connected to the battery, by means of two little brass connecting wires. One of these wires, the one that is crooked at both ends, is to be placed in a small hole near the top of the middle post, and the other end of the same wire is to be put into connection with the zinc in the copper box—it is to be connected with the zinc at the end where the two pieces of brass are soldered to it, by placing the flattened end of the wire between these pieces of brass. The other small brass wire is to be placed in a hole near the top of the post at the end of the instrument, that is, in the post to the right of the middle post as you face the front of the case; the other end of the same wire is to be connected to the copper box, near the right hand end of the box in a little pocket place adapted for its reception.

The zinc, in the above arrangement, is supposed to be in its proper place, that is, suspended in the copper box, by its ends being placed on two little projections at the ends of the copper box or battery. The end of the zinc, where the two brass pieces are soldered together, is to be placed on the left end of the copper battery as you face the rose-wood box.

The power of the instrument is increased or diminished by means of the piston, or tin tube, which goes into the helix or barrel; in proportion as this piston is drawn out, the power is diminished, and increased as it is inserted.

The SOLUTION by which the instrument is made to run is made as follows:—Dissolve half a pound of blue vitriol in a quart of boiling rain water, the vitriol first being pulverized. Let the solution cool. Then pour into the copper equal parts of this solution and rain water; or two table spoonsful of the pulverized blue vitriol may be put into the copper battery, and the battery be then filled with rain water, or any soft water, to within about one quarter of an inch of the top of the zinc. The zinc should be in the copper when the water is poured in, in order to know the quantity of water that is required.

The solution being in, and the connections formed as above, give the spring a little impulse with the finger, should it be necessary, and immediarely the vibratory motion of the spring commences. The wires* then, through which the magnetic fluid is to be conveyed to

* These wires, which are about five feet and a half long, are those which are attached to the two metallic buttons with the wooden knobs. These buttons, in order to diminish the stinging burning sensation, should be covered with sponge, or cotton cloth—I shall designate these wires by the name of the *Conductors*.

the body, are placed as follows :—the one with the brass hook at the end of it, is hooked into the hole near the top of the post to the right of the tin tube or piston ; the other wire, which has a flattened piece of brass on the end of it, is connected to the copper box, near the left hand end of the box, in a little place adapted for its reception. Understand, I mean by the left hand end of the box, the left hand as you face the front of the rose-wood case.

You will observe that there are four small posts of the same size on the instrument, three of them are on one side of the barrel, and one on the other The left end one of the three posts that are on the same side, is not to be used, it is placed there merely for uniformity sake, to correspond to the one opposite to it. In all other Electro-magnetic Machines, this post or pole has to be used, and without it they cannot convey the fluid to the body. My Torpedo, in this repect, differs from all other Electro-Magnetic machines.

When the machine is not in actual operation, the zinc ought to be kept out of the solution, in order that it may not be unnecessarily corroded. It can be placed on a little projection which is attached to the end of the copper box, the other end of the zinc resting on a copper partition in the middle of the copper box.

By the action of the zinc the solution gradually is decomposed, and the instrument works weaker and weaker, until the solution is made stronger. When it regains its full power.

The machine will always work well if the following be observed :

1st. That the solution be not too strong nor too weak.

2nd. That too much sediment be not deposited either on the zinc or on the bottom of the battery.

3rd That the zinc and copper do not touch in any place.

4th That the places where the ends of the connecting wires are put, be kept clear of rust and other matter.

5th That the cotton thread with which the conductors are covered, do not work down so as to prevent the contact of the wire which constitutes the conductor, and the little brass hook and tongue which are respectively fixed to the end of the conductors. Neither must this thread prevent the contact of the wire at the other end of the conductors, with the wooden knobs that are held in the hands while using the machine. When this thread works down, in the manner spoken of, it prevents the free passage of the electric fluid through the conductors. This is known, either by the conductors giving out no power at all, or by its being irregular and flickering. Again, if either of these wires of the conductors be broken, no power can be transmitted. When broken, however, they can be mended by twisting the two ends together.

6th. That the hammer on the end of the spring be at the proper distance from the end of the magnet, that is, at about one-sixteenth of an inch. And that the end of the screw which conveys the electric fluid to the spring, be just slightly in contact with the spring; for if this point be either a little too far from the spring, or too near, it will not vibrate.

7th. The platina on the spring and on the end of the screw that

touches the spring, should be kept clean, in order that the fluid be not impeded in its passage. Also, the end of the hammer and magnet must be kept clean. When the point of the screw need be brought nearer to the spring, or removed farther from it, it is done by turning the screw. Occasionally the point of the screw should be scraped, that is, when it becomes corroded.

The cleaner and brighter the zinc is kept, the stonger the instrument will run. It can be cleaned by scraping it well with a case-knife and washing it.

The sponges on the end of the conductors, when in use, should be kept wet. If the sponges be kept wet with a strong solution of salt and water, it greatly increases the intensity of the shock. This, however, it is probable will not be required.

The best time for cleaning the zinc, is immediately after using it. It is then cleaned much easier, and more effectually.

Each machine is accompanied with a metallic plate. This plate is generally to be used whenever the machine is applied. It can be laid upon the floor, if the patient is sitting up, and the bare foot or feet placed on it. One of the knobs of the conductor being placed upon it, and the other end of the conductor attached to one of the poles of the instrument, the electric circuit is thus formed as soon as the other conductor is applied to any part of the body. The sponge must be wet, otherwise the electric fluid would not pass through it.

In regard to the positive and negative poles, of Electro-magnetic Machines, I would observe that there appears to be with many considerable ambiguity. Each time that the electric current is broken by the vibration, of the spring, if the machine acts on the vibrating principle, or by the rotary motion of the armature, if it moves on the rotary principle, a shock is felt by the one who holds the conductors. At the moment when the primary current of the instrument is closed, the electric fluid passes along the conductors, (which are but a continuation of the secondary wire, or the fine wire of the helix,) from the positive to the negative pole. At the moment when the primary current is broken, a reverse current passes along the secondary wire, and a shock is felt by the one holding the knobs of the conductors, as the current passes back again from the negative to the positive pole. Hence, the current in the Electro-Magnetic Machines, is a to-and-fro current. Strictly speaking, therefore, the poles are *alternately* both positive and negative.

CAUTION.—I would here take the opportunity of apprising those who purchase Electro-magnetic Machines, that there is a gradual corrosion made on the platina which is soldered on to the spring where the two electric currents meet. This corrosion will progress until the platina is entirely eaten away, in consequence of which the motion of the machine stops, and it becomes entirely useless until the spring is re-set again with another piece of platina, or whatever other metal is used.

In the improved machine which I have invented and now offer

to the public, my attention has been particularly directed to this point, and I flatter myself that I have succeeded in making an instrument which far surpasses any other now in use. The platina on my spring is long and wide and the spring is so arranged that it can be moved when one point is corroded, so as to present another fresh point for contact to the end of the screw. This is effected by moving the magnet a little on its journal, an arrangement which the ordinary instruments have not, in consequence of which the Torpedo magnetic Machine will outlast any other hitherto invented.

GENERAL REMARKS

RELATIVE TO THE MANNER OF APPLYING THE MACHINE.

Different diseases require different modes of applying the Electro-magnetic Machine. Some diseases, such as rheumatism, dropsy, paralysis, etc., require a strong power. In some cases the application should be of short continuance, in other cases it should sometimes be protracted even for hours. Sometimes once in two or three days is sufficient, in other cases once or twice a day would be more beneficial. Some practitioners instead of using the metallic plates under the feet, prefer to have the feet of the patient immersed in blood-warm water.

The manner of applying the machine, which is the most agreeable to the patient, and probably the most beneficial, is for the operator to take one of the knobs of the conductor into his own hand, and thus letting the electric fluid pass through his own body, to communicate it to the patient by the instrumentality of his other hand. In this manner of applying the machine, the stinging burning sensation attendant on the application of the conductors alone, is greatly diminished. In operating on the eye, face, or head, this is decidedly the best way.

In some cases, as will be made evident when treating on the particular mode of application ; the hand, or rather the ends of the fingers are almost indispensably necessary to effect the object in view. This occurs when, for instance, we want to reach some of the deep seated nerves and muscles, as we shall, in the sequel, have to show.

Some recommend the electrical bath, but I cannot see any particular advantage to be derived from this. In some cases I think it would prove prejudicial.

In many cases the patient can apply the machine to himself without any assistance, as the conductors are insulated by means of non-conducting knobs, or handles. It is preferable, however, that the machine should be applied by another person, both for the sake of the advantage to the patient by the operators passing the electric fluid through the medium of his own body, as well as for the sake of the more complete and proper manner in which he can apply it.

Every facility ought to be afforded to the operator for applying the machine properly and thoroughly. Care should also be taken to avoid catching cold during the operation. Hence, if a considerable surface of the body is to be operated on, it would be advisable to have a blanket thrown over the parts, or something to prevent a chill. It would be best also, in such cases, to use spirits instead of water for wetting the sponges.

When a person is not accustomed to operating with the Electro-magnetic Machine it is always best to begin with a very moderate power Let him go over the parts to be operated on with the moderate power, and then let him increase the power by degrees till he ascertains how much the patient can bear in the different parts to be operated on. In some parts of the body a much stronger power can be borne than in other parts. Towards the root of the tongue a considerable power can be borne, whilst, on the contrary, at the end of the tongue the same intensity would be insupportable. A strong power can be borne when applied to the back of the neck, whereas, a comparatively weak power applied to the mastoid muscle on the side of the neck, produces very sudden and violent contractions. Hence, in operating, the piston has occasionally to be moved, as a greater or less power is required. This is easily regulated by a little care and attention.

I have observed a very singular effect produced in applying the conductor to the tip of the tongue. When thus applied with a moderate power, it excites a very copious ptyalism, the secretion of the saliva is immediately excited, and it will flow from the mouth in a stream.

As a diagnosis of disease, the Electro-magnetic Machine is unrivalled. By the aid of this invaluable auxiliary, we not unfrequently find that pain may be felt in a part remote from the true seat of the disease; in which case, when the conductor is placed on the part where the pain is felt, the usual indication of disease is wanting, but by passing the conductor over different parts, the true locality of the disease, and the real origin of the pain will soon be discovered.

The best time for applying the machine, I think, is just before retiring to rest. I form this opinion from the fact that the pores of the skin, under the operation, are always opened, and perspiration, more or less, always induced. It is true that there is less liability to taking cold after an Electro-magnetic perspiration, than after a perspiration induced in any other way; because, although the pores have been opened, the capillaries are not relaxed, but, on the contrary, are braced and strengthened by the impetus given to the vital action, under the Electro-magnetic stimulus.

In speaking of the manner of applying the Electro-magnetic Machine, I shall confine myself to those which I manufacture, and which, as they differ in their construction from other Electro-magnetic Machines, I have designated by the title of the "TORPEDO ELECTRO-MAGNETIC MACHINES," because they give out the shock not only from the two poles of the instrument, like other Magnetic machines, but also from the battery, as well as from all parts of the instrument which are in metallic communication with the battery. This no other Electro-mag-

netic Machine is known to do. This peculiarity, therefore, is a characteristic mark, by which the Torpedo can readily be distinguished from any other Electro-magnetic Machine.

In speaking of the conductors, the one in connection with the copper of the battery I shall call the *left hand conductor*, and that in connection with the little post near the bend of the magnet, or at the end, on the right hand of the piston, I shall call the *right hand conductor*.

There is a metal plate furnished with each machine, which, when the conductor is to be applied to the feet, is to be plaeed under, or against the soles of the feet, and the plate is to be connected with the right hand conductor by means of a short wire attached to it, or simply, by placing the knob of the conductor upon it. In applying the conductor to the part diseased, it must not be kept steadily to one spot, but be moved about.

Some operators generally commence their operations by wetting the hair with a sponge dipped in water, or spirits, as the case may require, and applying the conductor through the medium of their hand to the head of the person, both on the crown of the head and on the temple, the feet of the patient being on the metallic plate. In this operation let the power be light and continued about two minutes. Finally, after having used the conductors, let the operation be concluded by the operator passing his hands over the parts operated on, with a gentle pressure. Let the passes be made downward—a few minutes will be sufficient.

The power must be regulated according to the age and susceptibility of the patient. Some can bear and require a much stronger power than others, even in the same diseases. Much depends here on the skill and judgment of the operator.

There are some diseases which will be found spoken of in this treatise, which have been successfully treated by Galvanism, which may not have been subjected to the Electro-magnetic treatment; these I shall present to my readers as I find them. Electro-magnetism is only in its incipiency, and experience is still wanting relative to the best manner of using it.

I would observe that, sometimes, after a thorough operation with the Electro-magnetic Machine, the parts operated on will be made somewhat sore or lame. This happens sometimes when the power has been too strong—sometimes it occurs when the power has not been too strong. In either case, the intervals between the applications of the machine must be longer. Wait till the soreness subsides, or has nearly subsided before applying the machine again. In such cases, it is sometimes best to apply the machine but twice a week. Experience, however, will soon direct in such cases as these.

In using the ordinary Electro-magnetic Machines, the directions respecting the right hand conductor of the Torpedo, will apply to what is called the negative pole of those machines.

How much of the Electro-magnetic Fluid can be taken, and how long used without Injury.—There are several physicians who use the Torpedo Magnetic Machines, who are in the continual practice

of applying the Electro-magnetic fluid through the internal medium of their own body. One, in particular, Dr. Wm. Miller of this city, No. 346 Broome-street. His office is opened at 8 o'clock, in the morning, and closed, I think, at about 5, P. M. He has been using Electro-magnetism for several years as a curative agent, and continually passes the fluid through his own body to the patient. I presume he averages upwards of six hours daily during which the Electro-magnetic fluid is passing through him like a stream. He generally applies it too, with about as strong a power as the patient can conveniently bear. He informs me that so far from exhausting him, his health has been considerably improved by it, and that he weighs sixteen or eighteen pounds heavier than when he began the practice.

SPECIAL TREATMENT OF DISEASES.

In treating on the medical application of Galvanism and Electro-magnetism, I shall lay before my readers the various modes of treatment as practised by different individuals, as well as the manner in which I make the electropathic application myself. It is difficult, and I think I may say, impossible, in all cases, to determine what is the most advantageous manner of applying the electropathic remedies. There are, certainly, general principles of application, which every operator ought to be acquainted with, but as the use of Electro-magnetism has but recently been introduced into medical practice, it is not to be expected that the whole arcana of this subtle and wonderful agent have already been revealed. There is more yet, I think, to be achieved by electropathic remedies than has ever been dreamed of. I think it not improbable that the time is approaching when neuropathic remedies introduced into the system by Electro-magnetism will supercede the internal administration of any medicine whatsoever. This, perhaps, will appear a bold assertion; but let us cast our eyes a few years back, and how much more extravagant would it not have appeared, had we heard some soaring genius declare that the time was near, when probably, by the aid of this same subtle and wonder-working fluid, men would be able to communicate intelligence from one extremity of this continent to the other in less than a second of time. Look at the wires which are now spanning our country in all directions, conveying our thoughts, as if by magic, to the greatest distance in less than the twinkling of the eye, and then say, where shall we limit the wonder-working effects of this wonderful of all wonders of creation.

In treating on the special application of electropathic remedies, I shall not confine myself to any systematic arrangement of diseases, as the numbers of this work are now being published monthly, in pamphlet form of twelve pages each, consequently, as it will be several months before the whole series of this treatise will be written and published in its present form, a number of cures will have been made, and to be published, which, of course, would preclude the possibility of any other than a promiscuous arrangement. This, it is presumable, will be of no inconvenience, however, as there will be an index of the subjects treated upon, alphabetically arranged.

TETANUS, OR LOCKED-JAW.

"During the passage of the electric current," (says Matteucci,) "in a patient affected with tetanus, he experienced no violent convulsions; he was able to open and shut his mouth; and circulation and perspiration appeared to be re-established. Unfortunately, this amendment did not continue long; the disease being occasioned and kept up by the introduction of foreign bodies into the muscle of the leg. More satisfactory results from the electric current may be expected, in cases where tetanus has not been caused by a traumatic injury; moreover, we ought already to be thankful in being able to lessen the sufferings to which this dreadful disease gives rise."—*Physic Phenom.* p. 276.

The following cure of this dreadful disease by my Torpedo Magnetic Machine, was communicated to me in a letter from W. W. Chard, Esq. Post-master at Annisquam, Essex county, Massachusetts. He writes, "There has been one case of Locked-Jaw cured by the use of your Torpedo Magnetic Machine, under the practice of A. D. Bacon, M. D. The operation was complete and the patient restored to perfect health."

W. W. CHARD.

For the Locked-Jaw, let the right conductor be placed under the feet. Operator takes the left conductor in his left hand, and first applies it on the crown of the head, and the temples of the patient, with his right hand, the hair being made wet with a sponge dipped in spirits and water. Make the passes from the head down the whole course of the spine, during a few minutes. Then make them from the back of the neck down the spine, with a much heavier power; also over the liver, spleen, and stomach. After this let the conductor be taken from the feet and be placed in the patient's left hand. The left hand conductor is then to be placed immediately behind the clavicle or collar bone, for a few minutes. It is then to be passed over the brachial nerves on the neck near the cervical vertebræ. As soon as the Electro-magnetic fluid touches these nerves, it will be known by the strong contractions which will agitate the arm. This may be continued for some minutes. The same operation is then to be performed on the other arm. After this let the left conductor be placed on the *facial nerve*, where it passes across the under maxillary bone, and the right conductor be passed over the face. In other words, let the left conductor be placed on the under jaw-bone near the ear, and the right one be passed over the face. Let this be done alternately on both sides of the face Power pretty strong; to be continued for a few minutes or longer. Finally, let the operator pass both his hands over the patient's head, face, neck, and arms, during ten minutes. The passes to be made downward. Operations once or twice a day.

AFFECTION OF THE LIVER.

Dr. Wilson Philip observes that in cases "where there was a failure in the secreting power of the liver, or a defective action of the gall tubes, I have repeatedly seen, from Galvanism, the same effect on the biliary system which arises from calomel; a copious bilious discharge from the bowels, coming on a few hours after the employment of Galvanism."—*Sturgeon's Galv.* p. 112.

In complaints of the liver apply the right hand conductor of the Torpedo under the feet, and let the operator take the left hand conductor in his left hand, and apply his right hand over the liver, and stomach, and around over the region of the spleen and back. Then let him apply the left hand conductor to the back over the region of the kidneys and liver, and the right hand one let him take in his left hand, and apply his right hand over the liver. Operation once a day. Time thirty minutes—power moderate.

PALSIED LIMBS.

"It is well known that the temperature of a palsied limb is inferior to that of a sound one. Mr. Earle found the temperature of a palsied arm to be 70°; while that of the sound one was 92°; but, on electrifying the affected limb, the temperature rose to 77°."—*Golding Bird in Lond. Med. Gaz., May*, 1847.

The following is from Dr. John H. Estes:

Green Hill, Campbell Co., Va. June 15, 1849.

"Dear Sir—I have cured a case of Palsy by the use of your Torpedo, a case of *Paraplegica*. The lady was 76 years of age. She can at this time walk where she chooses, and use her hand to do any of her domestic concerns, as well as she ever could.

Yours, very respectfully, JOHN H. ESTES."

NEURALGIA.—AFFECTION OF THE HEART.—PARALYSIS.

The following is an extract of a Letter from Prof. G. R. Starkey.

"*Keene, N. H. June* 8, 1849.

"I have cured, in this place, by Electro-magnetism, two cases of facial Paralysis, two of aggravated Neuralgia, of years standing, one severe Affection of the Heart of six years standing, and pronounced incurable by eminent and far-famed doctors of this place.

Yours, truly, Prof. G. R. STARKEY."

THE NEURALGIA, which is a very painful nervous disease, generally makes its attacks on the face, feet, or breast; other parts of the body are sometimes, however, subject to it.

In this disease the right conductor is to be placed under the feet, while the operator, holding the left conductor in his left hand, applies

his right hand all over the parts affected. Power moderate. There should, also, be a general application in the usual way down the whole course of the spine, and over the liver, stomach, and spleen. The whole operation will require about half an hour. Operation once a day.

Palpitation of the Heart.—My own daughter, aged nine years, was affected with palpitation of the heart, attended with depression of spirits, loss of appetite, and general languor. The symptoms became alarming. I had recourse to the machine. Wonderful indeed was the effect! *One single application* made just before she retired to bed, *entirely stopped the palpitation.* I continued the application of the machine every night after this for six nights successively, just before she retired to bed, and an entire cure was effected.

The right conductor was applied to the back between the shoulders, and the left one over the region of the heart, breast, stomach, and liver daily. Power light, during a few minutes.

RHEUMATISM.—PARALYSIS.

The following commendation is from Dr. Wing, No. 347 Broome-street, New-York, who operates in conjunction with Dr. Wm. Miller.

"Dr. Smith—Dear Sir: Being in the constant use of the Electro-magnetic Machine, for the treatment of chronic diseases, I give you the two following cases as instances, among many others, of the immediate effects of the instrument when properly applied. Bridget ——, a domestic in the family of Mr. James Irvin, No. 347 Broome-street, was, a few weeks since, attacked with a complete paralysis of the left limb, rendering it entirely useless. The battery was applied, which caused a prickling sensation, and enabled her to make a little use of the limb in the course of a few hours. I applied it the second time which effected a complete cure within four days' time. Also, a lad living in Renwick-street, contracted a rheumatism in working over the steam at the hatting business, which left him unable to raise his hands to his head, or to dress himself without assistance. His neck was also crooked. He had been in this condition for some months. I applied the instrument for thirty minutes over his whole body. The effect was instantaneous. He could place the hands upon the head and back of his neck with ease, and dress himself without assistance. In two days' time he became straight and no further treatment was necessary.

"It seldom fails in Dyspepsia, Scrofula, Erysipelas, and Salt Rheum.

Yours, Austin Wing, 347 Broome-st., New-York."

DESPERATE CASE OF RHEUMATISM.

"*Essex, Essex County, Mass. Feb.* 18, 1847.

"I do hereby certify, that I was grievously diseased with the Rheumatism for over eleven years. During that time my right leg became

two inches shorter than the other, by reason of the pain in my right hip. At the end of eleven years it became much worse, and settled in both legs and every joint in me, so that I could not stoop down and pick anything from the floor, My knees were thrown asunder, so that I could not bring them together within seven inches. My legs, feet, and hips became so cold that, in winter, I very often burned them in trying to get them warm. My appetite began to fail and my activity forsook me. After trying every thing that was ever thought of, I gave up all hopes of ever being any better. I heard that W. W. Chard of Annisquam, Mass., was doing wonders with Dr. S. B. Smith's Electro-magnetic Machine. I determined to try once more. Accordingly, I went to his house and put myself under his treatment, and after trying the Machine ten or eleven times, I can say that I am well. If any one thinks that this is not true, let him call on me at Essex, Mass., and see for himself; or address a line to any gentleman in Essex, and learn the truth; for every one knows of the wonderful cure.

THOMAS DADE.'

INFLAMMATORY RHEUMATISM.

The following is an extract of a letter from H. U. Reynolds, M. D., of Jefferson, New-York, dated Feb. 15, 1847.

"I have several cases of interest on hand that are improving under the use of your Torpedo Magnetic Machine and Homœopathy, which I will give you as soon as discharged. I have lately cured a bad case of Inflammatory Rheumatism of four months' standing. When he came into my office, he could scarcely get there, and he had not undressed himself alone for four months. I operated on him three times, when he could travel as nimbly as any body, and take off his coat as quick as any man. Cured by six operations and a little Homœopathic medicine. Yours, in haste,

H. U. REYNOLDS."

Palsy or Paralysis is a genus of disease in the class *Neuroses*, and order *Comata* of Cullen. It is accompanied by a loss or diminution of the power of voluntary motion, affecting certain parts of the body.

There is a *Paralysis partialis*, or paralysis of some particular muscle—*Paralysis hemiplegica*, or palsy of one side longitudinally—*Paralysis paraplegica*, palsy of one half of the body taken transversely, as both legs and thighs, and *Paralysis venenata*, from the effects of poisons.

PARALYSIS PARTIALIS.—In this species of paralysis the left conductor should be applied below the affected muscles, and the right conductor above them. If, for instance, it be in the arm, the patient should have the left conductor applied alternately to the palm of his hand, to his wrist, and to the back of his hand; while the operator should apply the right conductor, first on the neck just back of the clavicle or collar bone, then on the brachial nerves on the under part of the arm, a little distance below the shoulder joint.

This method is to be adopted at each time the machine is to be applied. Operation once a day. In some cases a very strong power is required. In other cases not quite so strong, varying according to circumstances, as spoken of in the General Remarks on the manner of applying the Machine. Time—from ten minutes to half an hour.

Paralysis hemiplegica.—Left conductor to be applied to the soles of the feet.* Right one to the whole course of the spinal column, beginning at the neck and making the passes downward. Let it also be applied to the liver, stomach, spleen, and over the whole of the parts affected.

Operation once a day. Power strong. Time—from twenty minutes to three quarters of an hour.

Paralysis paraplegica and Paralysis venenata.—The conductors to be applied in the same manner as for Paralysis hemiplegica.

Matteucci, speaking of Paralysis, says "You should always commence by employing a very weak current. Take care never to continue the current for too long a period, especially if it be energetic. The Electro-magnetic machine is the most convenient apparatus for this purpose. The number of authentic cases of Paralysis cured by electrical treatment, is already sufficiently great to encourage physicians and patients to persevere in its use. Perseverance, indeed, is indispensable in the application of the electric current, for without it, successful results are impossible."—*Physic. Phenom.* p. 275.

* A typographical error occurs on Paralysis in the "*Scientific Examiner*," which is here corrected.

RHEUMATISM.

Rheumatism is distinguished into Acute and Chronic. The Acute is preceded by shivering, heat, thirst, and quick pulse; succeeded by pain which soon settles in the joints.

The Chronic Rheumatism is characterized by pains in the joints unaccompanied with heat. Of this kind is the *Lumbago*, or rheumatism in the loins; *sciatica*, seated in the hip; *arthrodynia*, in the joints.

Acute or Inflammatory Rheumatism.—The right hand conductor to be placed against the soles of the feet, the left hand one to be applied generally over the stomach, liver, spleen, and down the spine at a moderate power, during half an hour or more. After this, if the disease be in the shoulder or arm, the right conductor may be placed in the patient's hand, and the operator holding the conductor as usual, in his left hand, may apply, with a soft soothing power, his right hand to the parts affected, gently making the passes downward, during a few minutes. Finish, by the operator making passes with both his hands down the patient's arm, without the conductor in his hand.

The patient must not be exposed to the chilliness of the air during the operation.

Chronic Rheumatism.—Right conductor to be under the patient's

feet. Left one to be applied generally to the parts affected. It is advisable also to have the general application to the liver, stomach, and spine. Operation once a day—power strong. Time, from twenty minutes to half an hour or more.

In the treatment and cure of Thomas Dade as mentioned above, a few drops of spirits of turpentine were administered inwardly every other day.

Instead of using water to wet the sponges on the end of the conductors, it would be preferable to use a stimulating liniment made of capsicum (Cayenne pepper) and diluted alcohol with some oil of hemlock.

POISONING BY CUBEBS.

"The following important case," (says M. Donovan, M.R.I.A.,) "is one of the most convincing instances I have met of the great value of Magneto-electricity, as an auxiliary in the medical art; but for its aid the patient would, unquestionably have died. A gentleman residing in Valparaiso, had swallowed what he purchased as half an ounce of powder of cubebs. He retired to rest, but almost immediately felt a dizziness and inclination to sleep. He was accidentally discovered in the morning, by a physician, about twelve o'clock, with his face red and swollen, his lips dark purple, the veins of the forehead and temples turgid; the eyes rolled upwards, injected, and their pupils contracted to a point; pulse moderately full and very slow; respiration very slow and gasping. By agitating him violently he was aroused for a moment. He uttered some incoherent expressions, and sunk back into comatose sleep. After administering the usual remedies, the patient appeared to be sinking; the surface was cold and covered with a clammy sweat; the face was pallid and of a purplish tinge; the jaw and eye-lids were fallen, and feeling almost gone. Pulse scarcely perceptible, if at times it was to be felt at all.

"It was now three o'clock, P. M., there was no signs of reaction. An attempt was made to walk the patient in the cool air, the stimulants being continued; but, after a few unsuccessful efforts to move his legs, he sunk almost lifeless into the arms of his assistants. He could no longer swallow; his breathing became short and hurried; his mouth was widely extended and his jaw fallen. Nothing seemed capable of arousing him.

"His medical attendants, Drs. Page, Houston, and Barrabino, who seem to have left no effort untried to save the patient, now completely worn out with fruitless efforts, desisted. At this juncture the fortunate thought occurred to Dr. Page to try the effects of Magneto-electricity. Cerebial congestion was urged as an objection, but admitted not to be sufficient in such a desperate case, to set aside the experiment. The conductors were applied, at first, to each side of the neck, and then down behind the clavicles. The arms and body now moved convulsively, but the patient as unconscious as before. One conductor was passed over the region of the heart, and the other to a corresponding

point on the right side. In an instant his eyes opened widely, and with a ghastly expression of countenance; his head and body were thrown convulsively toward the operator, and he groaned. He then sunk back into his reclining posture, and was again asleep. The conductors were re-applied in the same situation, with similar results; a third and fourth time, and he cried "no more." Reaction was now positively established, the heart had received a strong impulse. The pulse was becoming rapidly developed, and the whole surface warm. He was left quiet for an hour, and then he could be awakened by shaking, or calling loudly his name. There was no further occasion for the Magneto Electric Machine. He was aroused at intervals, and at eleven o'clock at night was sufficiently awake to relate several particulars. On the following morning he was pretty well. He declared that he had heard many things the preceding day, that were said by the persons about him, but that he neither had the power to open his eyes nor move his tongue to speak. The last thing he recollected hearing was a remark made by Dr Page, 'that nothing more could be done but to make the experiment.' From that time all was blank to him, until, as he expressed it, he 'felt as if a gun had been fired off within him, which thrilled through and shook him to the very extremities.' This was the application of the Magneto Electrical Machine. That this patient would have died but for the electricity there can be no doubt; the sudden transition from the extreme limit of life to a flattering prospect of recovery, soon after realized, seems to settle this point. Were evidence wanted, we unfortunately have it in the death of a French gentleman, who took a dose of the same cubebs powder, purchased at the same place. At ten o'clock at night he swallowed half an ounce of cubebs, and at twelve o'clock next day he was a corpse. The fatal cubebs powder having been examined by a chemist, it was found that about seventy-five grains of opium had been contained in the dose taken by the patient."—*Dublin Quar. Jour. of Med. Sci. May*, 1847.

STRANGULATED HERNIA.

"An ingenious application of Galvanism has been conceived by M. Le Roy d'Eliolle, which certainly deserves the consideration of the profession. It is the proposal of a method of employing this powerful agent, Galvanism, in the reduction of Strangulated Hernia, and internal strangulation.

"After noticing the different modes of treatment adopted by surgeons in strangulated Hernia, he observes, "That the administration of purgatives, either by the mouth or the anus, by determining contractions in the intestinal tube, have often succeeded in reducing strangulations, when all other means have failed. But purgatives, notwithstanding their good effects, are, in other respects, injurious; they cannot produce the peristaltic motion of the intestines without occasioning more or less irritation, which is always dangerous, whatever may be the results. In fine, purgatives can only exert their influence in the incarcerated portion of the intestines, after having exercised it on

the parts nearest to the stomach, wherever may result a considerable accumulation of the fæces in the hernia and increased danger in the symptoms.

"But the author conceives that means may be found of determining, more safe, more powerful, more prompt, and more general, contractions in the digestive tube than those produced by purgatives. Already it has been found that a galvanic current passing from the mouth to the anus causes purgation more or less active. M. Le Roy describes the action of eight or twelve pairs of inch and a-half plates, one pole on the tongue, the other in the anus. Having already mentioned the effects of the experiment, I shall now proceed to connect them with others calculated to prove the benefit desirable from this mode of operation.

"Having made an incision in the parietes of the abdomen of a rabbit, he drew out a portion of the intestine, and placed the zinc pole of six pairs in the mouth, and the copper pole in the anus. An undulating movement was established in the intestine previously motionless; no shock was received, nor were there any contractions of the abdominal muscles. The peristaltic motion continued even after the removal of the galvanic influence. A ligature being placed on a portion of the intestine, the contractions were weaker at that spot, but more energetic at the contiguous parts, and tended to disengage the intestine from the ligature. If the two conductors were placed on the intestine, opposite each other, the contraction was much stronger, and the fæces were forcibly drawn upwards and downwards; by placing the conductors farther on, the fæces were rapidly drawn forward, and the volume of the intestine was much reduced. If a portion of the intestine containing the fæces or gas, were tied by a ligature in such a way as to resemble strangulation, and the conductors applied, the contraction reduced the intestine to a third, or even a fifth, of its original volume, and it could then easily pass through the ligature which bound it previously. If, instead of thus imitating inguinal or crural Hernia, a third part, or half of the diameter of the intestine only be pinched up, immediately, after the contact of the poles, the intestine contracts and escapes from the fingers, provided the force that held it is not too great. When the integuments were drawn over the intestine, and the galvanic fluid was made to pass to that organ by means of acupuncture needles, the same results occurred as when it was uncovered.

"M. Le Roy concludes from these experiments, that in Ileus, a disease almost always mortal, we may attempt the removal of the strangulation or invagination by establishing a galvanic current from the mouth to the anus produced by ten or twenty pairs of two inch plates. In Hernias which form an obvious tumor, a similar current may be established, but the current will be more energetic if the conducting wires be applied to the tumor. After having thus applied galvanism in two or three parts of the tumor for two or three minutes, the attempts at reduction are to be renewed, and then, probably, the contracted intestine, reduced to a third or a fourth of its volume, will clear itself of the opening in which it was strangulated, and will re-

turn into the abdomen. But it is chiefly in Hernia *par engouement*, that galvanism is advantageous; the intestine, in a state of atony, cannot free itself from the adventitious matter, and is, therefore, distended by it. The galvanic influence, giving energy to that organ, the fæces will be expelled, and the symptoms will disappear."—*Dub. Quar. Jour. Med. Sci., Feb.* 1847.

BILIOUS COMPLAINTS.

"The beneficial effects of Galvanism in Asthmatic and Bilious Complaints," (observes Sturgeon) "have several times come under my own notice."—*Sturgeon's Galv.* p. 112.

In bilious complaints, the left conductor to be applied over the liver, stomach, and abdomen; and the right one to the back. Then vary by placing the right conductor under the feet, and the left one pass over the back, liver, and stomach. Application once a day. Power moderate—time, ten to twenty minutes.

ASTHMA.

The following is from M. Donovan, published in The Dublin Medical Journal.

"Mr. Cole, house-surgeon to the Worcester Infirmary, informed Dr. Philip that no other means employed there have been equally efficacious in relieving Asthma, as Galvanism.

"The beneficial effects of Galvanism, in Asthma, have also been proved by other practitioners. M. Martinet reports the case of a man aged sixty-six years, admitted into one of the clinical wards of Professor Récaincer. For a long time he had suffered from the Asthma, which, two days before his admission to the Hotel Dieu, was very much increased. The case was selected for the trial of the effects of Galvanism in this disease. When the use of this agent was begun the asthmatic disorder was in full force: but before the first essay was over, the respiration was free. Galvanism was continued every second day, and at the end of twelve applications, the patient was perfectly cured of his *dyspnœa*. He ran up a stair of fifty steps with quickness and facility, and without being at all oppressed."—*Dublin Quar. Jour. Med. Sci. May,* 1847.

"I have employed Galvanism," (says this eminent physiologist, Dr. Wilson Philip,) "in many cases of habitual Asthma, and almost uniformly with relief. The time during which the Galvanism was applied before the patient said that his breathing was easy, varied from five minutes to a quarter of an hour. It was applied from the nape of the neck to the pit of the stomach. The cough under its use, generally becomes less frequent in proportion as the accumulation of phlegm in the lungs is prevented. It is remarkable, that in several who had labored under asthmatical breathing for ten or twenty years, it gave relief quite as speedily as in recent cases. In some laboring under the most chronic forms of Phthisis, in whom the symptoms had lasted several years, the relief obtained from galvanism was very great, not-

withstanding the admixture of some pus-like substance in what was expectorated. The permanence of the good effects of galvanism in the diseases before us has appeared very remarkable."—*Sturgeon's Galv.* p. 111, also *Dub. Med. Jour.* 1847, p. 305.

"There are certain cases of Asthma," (says Smee,) "in which benefit may be derived from the application of electricity to the chest. In this instance the muscles of respiration should, as far as possible, be brought into play, and the electricity should be continued till the skin is reddened. I need hardly state that electricity will be valueless, if organic changes have been the cause of the asthma, as it is only calculated to be eminently useful in functional derangements. The electricity which is preferable is that derived from the Electro-magnetic and Magneto-electric Machines. It should be used to as great an extent as the patient can comfortably bear."—*Elem. Electro-biol.* p. 153.

AMENORRHŒA,

INTERRUPTION OR RETENTION OF THE MENSES.

"In a former chapter, I have detailed" (says Smee,) "the remarkable effect which electricity has upon the motion of the blood in the capillaries; and there it is ascertained that it must influence all action which immediately depend upon the circulation of the blood. In Amenorrhœa, we may assume that the uterus is not perfectly supplied with blood, to perform the normal functions; and in these cases electricity comes to our aid with the best possible effect. Of course, if the female is in a state of bloodlessness, the use of iron in all its forms has the sanction of medical men, as an invaluable auxiliary in those cases. The electricity should be applied to the inside of the thighs, the loins, and the bottom of the stomach. We occasionally perceive cases, in which the suppression of this function is attended with much constitutional disturbance, such as the continual recurrence of hysterical fits. In these cases, it is sometimes of importance to cause the secretion to take place with the least possible delay, when the electricity should be applied to the uterus itself by introducing a conductor into the vagina, that it may actually come in contact with that organ.* The opposite pole should be moved over the lower part of the stomach, and the surface of the thighs, the loins, and the surrounding parts. The amount of electricity must not exceed that which the patient can comfortably bear. The current from the Electro-magnetic Machine is the best for this purpose."—*Elem. Electro-biol.* p. 152.

When the case, however, is not so urgent as that mentioned by Smee, it will generally suffice to pass the left conductor over the lower

* This conductor should be covered with caoutchouc or some other insulating substance, except at and near the termination of it; as the object is to act upon the uterus and not on the vagina.

part of the abdomen, the surface of the thighs, and about the exterior of the vagina, or external orifice of the womb. The right conductor apply over the second and third *lumbar vertebræ* near the lower part of the spine, To be applied daily at a moderate power. Time about a quarter of an hour; the power may be increased it circumstances require it.

HYDROPHOBIA.

"The following remarkable case of recovery from Hydrophobia, by Galvanism," (says M. Donovan,) "would scarcely be credited but that it is well attested. It is extracted from a 'Report presented to the Class of the Exact Sciences of the Academy of Turin, on the action of Galvanism,' by Sr. Vassalli Eandi.

"A man, bitten in the finger by a mad dog, came to consult him on account of the pain he felt in the arm, the back, and particularly in the finger which had been bitten a month before. The actual cautery applied to the finger removed the pains, but in a few days after they were again felt, accompanied by symptoms of Hydrophobia. The patient could no longer look upon water without trembling, and inflammation in the throat prevented his swallowing bread—even after he had chewed it: and a strong desire to bite was manifested every moment.

"In this state he was brought to Sr. Rossi, who, seeing that he could not bear the sight of water, and not even of bright bodies, prepared, in another apartment, a pile of fifty pairs of dics of silver and zinc, alternated with pasteboards moistened in a solution of muriate of ammonia. Finally, he used a small band of moistened coarse paper, as a conductor, on which the naked feet of the patient were placed, and at the moment when he opened his mouth to bite, one end of a conducting arc was pushed in, the other end being connected with the pile. The patient suffered much from this operation, which, after many shocks weakened him so that he could no longer support himself. Being then stretched on the ground, he was galvanized at ease. The operation caused the perspiration to break out in drops. Next morning the patient himself came to Sr. Rossi and informed him that he was completely cured, as he no longer felt pain or difficulty in swallowing, and that he had entirely ceased to feel an aversion to water or liquids: no reasoning, however, could persuade him to submit to a new operation. But a few days after, some slight pams having made him apprehensive of a new attack of Hydrophobia, he returned to Rossi, who, by means of Galvanism, again caused all the symptoms to disappear. This cure was effected in the presence of several persons. Such sensibility had the patient, that he felt the effects of the shocks for a month after in his shoulders."—*Dublin Quar. Jour. Med. Sci. May*, 1849.

I have just been informed, by one of my travelling agents, of a most remarkable cure which he has effected by the use of the Toroedo, on a person bitten by a mad dog.

The usual symptoms of Hydrophobia commenced on the twentieth day after the young man was bitten. He foamed at the mouth, and walked about like a person frantic. The first thing done was to use the Torpedo, which, in thirty minutes, lulled the pain, yet his eyes, like balls of glass, rolled in every direction, and his whole frame quaked. The sight or the sound of liquids would cause him to shudder and start with sudden fright. The Torpedo was used on him for more than three weeks, and he was given vinegar to drink freely during the same time—this kept him quiet; the torpedo was used ten hours a day, and some days sixteen hours out of the twenty-four, without intermission, except for the cleaning of the zinc and the renewing of the solution, which required about three minutes, and this was the only thing that kept him alive. It is now four weeks since, and my agent states that the young man is able to walk about the house, and even to ride out.

This remarkable cure, for humanity's sake, I hope will be extensively circulated through the medium of the newspapers and medical works, throughout the whole country. This is the only cure ever known, I presume, to have been effected of the Hydrophobia after the paroxysms had commenced.

I have lately received a letter from the above-mentioned agent giving me a more detailed account of the manner of using the machine for Hydrophobia; which is as follows;

"Let the feet of the patient be put into a tin pan half full of strong salt water. Place into this the right hand conductor. Let the knob of the left hand conductor be taken off, and in its place fix on to the wire constituting the conductor, a piece of sponge. Prepare a bowl of salt and vinegar, as strong as it can be made; dip the sponge into this mixture and apply it to the throat and upon the tonsils; also upon the heart and spleen, with a power as strong as the patient can bear. As a preliminary, however, when the symptoms first appear, give the patient to drink from a gill to half a pint of vinegar at a draught, as may be thought proper. If the paroxysms have commenced, give a strong tea of scullcap, (*Scutellaria Lateriflora,*) and repeat according to the urgency of the case. Apply the machine stronger and stronger —continue its application, if circumstances should require it even during forty-eight hours.

"Precaution.—Great care should be taken to empty the battery of the solution of vitriol, used on a hydrophobic patient, previously to using the machine on any other patient. The sponges also should be changed."

CHOREA.—ST. VITUS' DANCE.

"Of all the remedies I have hitherto used," (says Dr. Gol ng Bi d) except, perhaps, the sulphate of zinc, electricity seems most successful in Chorea. It has this further advantage, that it interferes in no way with the internal administration of remedies—a remark that, of course, applies equally to all diseases in which it is employed."—*British and For. Med. Chir. Review, April,* 1849.

The following is an extract of a letter from S. K. Grant, Bookseller, dated Louisville, Kentucky, May 15th, 1848.

"Dear Sir—I have performed, with your Machine, a very remarkable cure of St. Vitus' Dance, in a little girl who had not walked a step for three years. Since the fifth application of the machine the child has been running about, playing with the other children, without showing the least symptom of the disease. The family physician told me he considered it the most remarkable cure he ever heard of.

S. K. Grant."

The following is an extract of a letter from Dr. L. D. Fleming, formerly of Newark, N. J., now of New Bedford, Mass.

"*Newark, Dec.* 19, 1844.

"I have just relieved two severe cases of St Vitus' Dance. I might multiply the cases, but this must answer for the present.

Yours as ever, L. D. Fleming."

Let the feet be placed in blood-warm water—introduce the right conductor into the water. Wet the patient's hair with spirits and water, or Cologne water. The operator, holding the other conductor as usual in one hand, applies the other hand to the crown of the patient's head and to the temples, with a moderate power a few minutes. Then down the neck, arms, breast, on the stomach, and down the back, with a much stronger power, during from ten minutes to three quarters of an hour according to circumstances, to age, constitution, severity of the case, &c. Operation once or twice a day.

HEAD-ACHE, EPILEPTIC FITS, PARALYSIS,* SCIATICA.†

"Dr. Marcus reports several instances of the successful application o. Galvanism in the great hospital of Bamberg. One was a case of Paralysis of the arm, in which a complete cure was effected. Another was one of violent Head-ache after a remitting fever, which could not be subdued by any medical treatment. The pain was lessened during the first application, when the temples, the forehead and the neck, were moderately galvanized, and after some further application it ceased entirely. But, in a few days it returned; the experiment was repeated, and by this it was entirely removed. A case of Sciatica, which

---

* p. 55. † p. 58.

had resisted all remedies for more than two months, was completely cured by Galvanism, after its application had been repeated for eleven days successively. Three instances are given of the control of Galvanism over Epileptic Fits, the paroxysm having immediately ceased on bringing the hands of the patient into proper contact with the two poles of the pile. By employing galvanism with one of these when he was free from the disease, the paroxysm was postponed. Dr. Marcus recommends the conductors to be applied to the spine, where the nerves of the neck, back, and lumbar region, issue."—*Donovan in Dub. Quar. Jour. Med. Sci., May*, 1847.

Head-ache.—For Nervous Head-ache, let the hair on the crown of the head be wet with water, and apply to it the left conductor, and the right one under the feet. Let the power be very light, and of short duration. Some passes may likewise be made down the temples. Once a day is sufficient.

In all applications of Electro-magnetism to the head, it is best for the electric fluid to be communicated through the medium of the operator's hand.

For Head-ache arising from a disordered stomach, the right conductor should be placed, first, on the spine directly back of the stomach; and the left conductor should be passed all over the stomach at a moderate power for a short time, twice a day; finish by placing the right conductor under the feet, and passing the left over the head, as directed in Nervous Head-ache.

Epileptic Fits (*Epilepsia*).—Epilepsy may be distinguished into sympathetic and idiopathic. It is sympathetic when produced by an affection in some other part of the body, such as acidity in the stomach, worms, teething, &c. And idiopathic when it is a primary disease, neither depending on, nor arising from any other disease.

It is sometimes hereditary; and this is the most difficult to cure. It is not always easy to ascertain the true cause of Epilepsy, but the machine may always be advantageously employed.

When the time for the recurrence of the fit can be anticipated, it might be prevented by a timely application of the machine, say once or twice daily, for several days.

Let the right conductor be placed under the feet, and let the operator (holding the left conductor as usual) apply his hand on the patient's head, the hair being made wet with diluted spirits. Power moderate, and for a few minutes only. Let the left conductor then be applied generally over the spine, stomach, liver, spleen, and abdomen. If the patient be a female, and there should be any apprehension that the cause of the fits proceeds from some uterine derangement, obstruction, or irregularity, the left conductor should also be applied to the *os uteri*, the mouth of the womb; the right to the back of the neck, and down the spine. Power moderate, from fifteen to thirty minutes, once a day

CHOLERA.

The following is taken from the "London Magnet," July 2, 1849.

"One of the Tooting children was seized with the Cholera in the Royal Free Hospital. The patient was a girl about eight years old, under Dr. Peacock's charge. In about four hours she became completely collapsed, the power of deglutition had ceased, and consequently all internal remedies were useless. Dr. Peacock applied one pole of the galvanic machine over the heart, and the other over the region of the stomach, or rather of the solar plexus (a sort of grand central terminus of the nerves, supplying all the viscera). In half an hour the child began to rally, some strong beef tea was got into her stomach in less than ten minutes, and ultimately the resurrection of the child was complete."

Smee, alluding to the above case, writes as follows:—"I have heard," (says he) "that Electricity has been advantageously employed at the Free Hospital, to rally a patient in the collapsed stage of Cholera,—a fact which I mention here, as this disease involves, to a great extent, the functions of the alimentary canal."—*Elem. Electro-biol.* p. 155.

The following case of Cholera, I take from a letter written to me by an Agent at Woodstock, Conn., dated Oct. 16, 1849.

The case was that of a young man who went out in the morning to cut hay, his health apparently as well as usual. At ten o'clock, he was suddenly taken sick with vomiting and purging. He was then carried to the house where the usual cholera remedies were administered, but to no purpose. At twelve o'clock, he became senseless, cold and rigid. At this crisis, the Torpedo Magnetic Machine, which happened to be in the neighborhood, was procured, and applied to the patient. After using the machine about one hour, warmth began to be felt under the patient's arms and across the chest. The heart again commenced beating, and by continuing the application of the machine about half an hour longer, the patient was aroused, free from pain, and in a profuse perspiration. The next day he was so well restored that he was able to resume his usual labor."

BARRENNESS—IMPOTENCE.

"The same reason," (says Smee) "for which Electricity is valuable in Amenorrhœa, might lead us to expect that it would tend to rectify the state of barrenness in the female; for, by causing it to act directly upon the uterus, it is calculated to increase the supply of blood, and thus remedy the deficit."—*Elem. Electro-biol.*, p. 152.

In Barrenness, the right conductor to be applied to the lumbar vertebræ, the lower part of the spine, and the left to be introduced into the vagina so as to touch the *os uteri*, the mouth of the womb.

This conductor may be made of a piece of silver or copper wire of proper thickness, covered with cotton thread and varnished with seal-

ing-wax varnish, or with gutta-percha. A small piece of fine soft sponge is to be firmly fastened to the end of this in contact with the *bare* wire, which, at the point where the sponge is to be attached to it, is not to be insulated or covered with the thread, otherwise, the electro-magnetic fluid could not pass from the conductor to the sponge. The sponge to be wet. The power to be moderate, and to be applied at short intervals during half an hour, once a day. The left conductor may also be applied externally over the lower part of the abdomen.

For Impotency the right conductor is to be applied to the genital parts and about the lower part of the abdomen. The left one to be applied to the organ of Amativeness, or on the neck near the back part of the head. Then vary, by applying the right conductor to the genital parts, and the left to the lumbar vertebræ. Power moderate, from ten to twenty minutes—once a day.

CONSUMPTION.—*Phthisis Pulmonolis.*

The following is an extract of a letter from JOHN H. ESTES, M. D., dated Green Hill, Campbell Co., Virginia, April 7th, 1849.

"DR. SMITH: Dear Sir—I have been using the Torpedo Magnetic Machine I purchased of you last year with great success in several chronic cases in my neighborhood. The patients who have used the machine seem to have great confidence in electricity as a remedial agent, as imparted to them through your machine.

"I think they will take finely in this part of the country.

"A lady who has been afflicted with Consumption for twenty years, has been using the above machine, and has received so much benefit that she called on me to send to you for one of your best machines. I think, by using it as directed, she will finally recover. Please forward without delay. Yours, very respectfully,

JOHN H. ESTES, M. D."

The following statement of the cure of *Phthisis Pulmonalis*, is from a lady living on the Bloomingdale Road, near 50th-st., New-York.

"I was attacked with a severe cold in the beginning of February, 1849, and the disease progressed, indicating a confirmed Consumption. I coughed much and expectorated a pus-like substance. I was so extremely weak as scarcely to be able to sit one hour at a time. About the middle of June I went to my brother's, in the country, who had the Magnetic Machine, which was applied daily for five weeks, when an entire cure was effected. During the time I gained eleven pounds in weight, and returned to the city in perfect health. During the time I took no medicine whatever; and I attribute the cure, under God's blessing, entirely to the machine.

MIRIAM E. BOLL."

The person mentioned above who applies the machine, is her sister-in-law, who lives near Avon, in the state of New-York. She informs me that the cures performed by her are wonderful. Among the rest are some tumors of long standing.

In Consumption let the left conductor be applied to the seventh or lower cervical vertebra, to the spine at the lower part of the neck, and between the shoulders. Let the operator, holding the right conductor in his left hand, pass his right hand over the patient's breast in every part, also, over his stomach and liver. Vary, by placing the right conductor under the patient's feet, and let the operator, holding the left conductor in his left hand, pass his right hand over the patient's back and breast. Power moderate. Time from fifteen to twenty minutes, once a day.

SCROFULA.

Electro-magnetism I regard as the most efficacious of all remedies in all scrofulous affections. Previously to my commencing the manufacture and use of the Electro-magnetic Machines, one of my children, a daughter, aged five years, was afflicted with a very inveterate and protracted scrofulous affection, which had continued its ravages near two years. Various remedies were tried but without effect. The disease exhibited itself in five deep-seated ulcers, the discharges from which were acrimonious and very fœtid. At this crisis, I commenced the duodynamic treatment with the Electro-magnetic Machine. The only remedies I applied in conjunction with the machine, were that the ulcers were washed twice a day with a strong decoction of red raspberry leaves, and a drink used every day of a tea made of equal parts of bayberry leaves, sarsaparilla and burdock root. Also, after having continued the remedies above-mentioned about two weeks, until the inflammation was considerably abated, I commenced applying a stimulating liniment round about the ulcers, not, however, touching them with it;—the liniment should be made wholly of vegetable productions. I continued the application of this till the cure was effected.

Under this treatment a perfect cure was effected in six weeks. It is now five years since and not the slightest symptom of Scrofula is to be seen. The scars are still plainly visible, and can be seen by any one who desires it. S. B. Smith, New-York.

The following is an extract of a letter from W. W. Bayless, Deputy Postmaster, dated Morgantown, Blount Co., Tenn., May 27, 1849.

"Dr. S. B. Smith: Dear Sir—I operated five times, with the Torpedo, on a patient afflicted with the Scrofula on his neck and shoulders, At the time I applied the machine he had twelve ulcers that had gathered, and had been discharging over a year. He was unable to wear his coat during the whole of last winter. He is now well.

"I operated on another case of Scrofula on the jaw under the ear. The ulcer had broken internally. It was of eight years standing. This patient also is cured, after being operated on two weeks, and the ulcers are entirely healed up. W. W. Bayless, Dep. Postmaster."

In Scrofula, apply the right conductor round about the part affected and the left conductor to the spine at the nearest point to the affected part. Power moderate, from ten to fifteen minutes. Then vary, by

placing the right conductor under the feet, and applying the left one round about the affected part, during five minutes.

EPILEPTIC FITS.

The following is an extract of a letter from Dr. J. Hoffman, dated Huntingdon, Pa., March 15, 1849.

"Dr. S. B. Smith:—One surprising circumstance has been effected by the application of the (torpedo) galvanic battery: a young woman, twenty-seven years old, was cured of spasms which had afflicted her for near ten years. She was subject to upward of fifty spasms every day, some so violent as to throw her out of bed. The noise of a dog barking, a fowl cackling or crowing, the sound of a cow-bell, or the bellowing of a cow, or almost any trifling noise, would bring on spasms which would last sometimes two or three hours, at other times not so long. This young woman had one of her legs amputated five years since, on account of a disease in her foot, which was supposed to be the cause of her spasms. It did relieve her of the spasms for several months, but they returned again; and it required some person to be with her to help her to turn in bed, so much was she disabled. She can now write, and is teaching school.

"Yours, J. Hoffman."

The following is from Dr. Joseph Heidenthral, dated Williamsburgh, Blair Co., Pa., Feb. 27, 1850.

"I cured a case of Epilepsy on a seven year's aged boy by your Torpedo Electro-magnetic Machine, and some nitrate of silver, and radix valerianæ, and simple diet. Yours, etc.,

"Joseph Heidenthral."

The following is an extract of a letter from Dr. Samuel Carpenter, dated Providence, R. I., Feb. 16, 1850.

"Dear Sir:—A man came to me a few days since, who had had fits fifteen years, once a month. For two years past they have occurred twice a week; and during the last six months he has been afflicted with them every week. The first operation of your Torpedo broke up the fits, and he has had none since. Samuel Carpenter."

The following is an extract of a letter from H. Alexander, P. M.

"Callensburgh, Armstrong Co., Pa., Sept. 10, 1849.

"Dr. S. B. Smith: Dear Sir—I think I will be able, in a short time, to bring your Torpedo into notice in this section of country, as the one I got from you has cured a number of persons of Fits, Palpitation of the Heart, and Nervous Diseases, etc. Physicians are beginning to recommend them in all nervous diseases.

"Respectfully yours,

"H. Alexander."

For Epileptic Fits, the patient should have a general application of the machine daily. Commence by placing the patient's feet in blood-warm water; drop the right hand conductor into the water; then

apply the left conductor to the top of the head and over the temples (the hair being previously wet with spirits and water) with a light power during five minutes; be careful that the power be light. Then proceed to apply the left conductor over the liver, stomach, bowels, and spleen, and down the whole course of the spine, at a moderate power during three quarters of an hour, once a day.

FEVER AND AGUE.

The following is from Dr. James Whitney, dated Schoeppel, Oswego Co., N. Y., May 7, 1849.

"Dear Sir:—I take up my pen to write a few lines to inform you something respecting your Magnetic Machine. It is now about a year ago I received one of your Torpedos, and I have found it to be very useful in some cases of the Fever and Ague. I have cured with one operation. Some cases require more; but I think I can cure almost any case with three operations. Other fevers, by commencing in season, are cured in the same way.

"I have helped a number with Rheumatic complaints. One case of Inflammatory Rheumatism was a woman who had it in her arm and shoulder, so that she could not use it, and had not used it for six months past. It was badly swelled, and one operation entirely reduced it. Yours, etc.,

"James Whitney."

For Fever and Ague, let the patient, just previous to the anticipated hour of attack, be placed under circumstances to induce sweating. Let the feet then be placed in warm water, and the right conductor dropped into the water. Let the left conductor be freely applied over the whole body, care being taken to prevent the patient's receiving any chill from the air. Begin with a moderate power, and increase it if any symptoms of the chill should be perceived. The operation may be continued, according to circumstances, from half an hour to an hour.

TOOTHACHE.

For the Toothache, let the right conductor be placed on the tooth itself. This can be done by holding a teaspoon against the end of the conductor, and applying the small end of the spoon to the tooth. In doing this, it will be necessary to prevent the spoon from being in contact with the hand that holds it. This is easily effected by holding it against the conductor with any insulating substance between the conductor and the hand, such as a silk handkerchief or a piece of dry muslin. Let the left conductor be placed on the facial nerve, on the lower jaw, just below the ear. Power moderate, from five to twenty minutes. Sometimes a cure is effected in half a minute or less; at other times it has been applied during an hour and a half, and with a strong power, before a cure was effected.

HIP DISEASE AND NEURALGIA.

The following is from Dr. Parker, dated :

"PARISHVILLE, N. Y., April 14, 1848.

"Dear Sir: I think much of your Torpedo Magnetic Machine in nearly all cases of rheumatism and neuralgic complaints. I have tested it upon a man forty years of age, afflicted with the hip disease, who had been ten weeks confined from labor, and says he had not lain in bed all night one night in that time; but after the first application of the Torpedo, he has been able to rest well, and, after three weeks, is now able to labor as usual.

"I have also applied it to a Mrs. Gilbert, who had been afflicted six years with the hip complaint. There is a change of structure which it can not be expected to remedy in this case, but the relief has been very remarkable; and Mr. Gilbert says, that he would rather give up half of his farm, than have his wife set back where she was a year ago, if he could not get one of your machines. Many cases of rheumatism have been cured by two or three applications.

"Yours, truly, F. PARKER."

For the hip disease (*coxalgia*), let the right conductor be placed under the feet, and the left one be applied down the spine, over the liver, and over the affected parts; power moderate, during from ten to twenty minutes, once a day.

REDUCTION OF A HUGE TUMOR!

"AVON SPRINGS, Livingston Co., N. Y., Jan. 14, 1850.

"DR. S. B. SMITH—

"In the winter of 1847–8 I was troubled with an enormous tumor, which appeared to affect my health to that degree, that I was reduced almost to a skeleton, and few of my friends or acquaintances had any idea that I could live but a short time. Mrs. C. M. Noe, at whose solicitation I send this, having been informed of my distressing condition, and having one of your Electro-magnetic Machines, kindly offered to magnetize me, believing it would help me.

"I was induced to try it, and found it gave me ease, and I rested well, which before seemed impossible. After being magnetized nineteen times, it came to a head, and, at the first discharge, ten quarts came from it in one day; the second day, a pint; the third, two quarts; continuing to discharge for some time, some opinion may be formed of its size from the first discharge.

"My physician said he had no doubt that as much as the weight of my body had passed through it. I now enjoy good health. I make this public, with the desire that others in suffering and distress may also find relief. It was about twenty-two months accumulating. I was five years out of health. HARRIET E. HOWELL."

For tumors, let the right conductor be placed under the feet; the left one to be applied all around the parts adjacent to the tumor. Vary, by placing the right conductor in a part of the body opposite to the tumor in such a manner that the electro-magnetic current will pass through the tumor in different directions; power moderate, five, ten, or fifteen minutes, once in two days.

THE GALVANIC INFLUENCE, IN PROMOTING THE ALVINE EVACUATIONS, OPENS AND STRENGTHENS THE BOWELS.

"One of the most important and curious of the physiological properties of the galvanic influence," says M. Donavan, "is its power over the peristaltic motion of the intestinal canal, and the consequent evacuation of the fæces. The power over the peristaltic motion, denied by Volta, was, I believe, first observed by Grapengiesser; but the resulting effects were discovered by M. Le Roy. This property is the more valuable, inasmuch as the method of the application is so simple and safe.

"M. Le Roy, d'Etoille, says, that if a trough consisting of eight or twelve pairs of an inch and a half plates be employed, as soon as a current is established by the conducting wires from the tongue to the anus, a gentle warmth is felt in both parts; slight flashes appear before the eyes; movements are felt in the abdomen, but no general shock is communicated. If the experiment be continued during a quarter of an hour, a weight is felt in the rectum, and one or two alvine evacuations result. If fifteen or twenty pairs of plates be employed, the effects are more decided, and purging ensues, without the smallest injury to health.

"It has been proved by Mr. J. Clarkson, that the same results may be produced by the same agency applied in a different manner. A gentlemen afflicted by a painful tumor in the right side, immediately under the liver, which was suspected to proceed from an obstinate obstruction in some part of the intestines, found no relief in medical treatment; galvanism was therefore resolved on, and was employed in the following manner: the terminal balls of a galvanic battery of fifty plates, each two inches square, were applied all around the hardened part, during twenty or thirty minutes, twice a day, for ten days, the skin having been previously moistened. Every application gave him more or less relief, and at the end of that period he was well. But after the application had been made for a few minutes, a motion of the bowels usually, if not always, commenced, with a rumbling noise, followed, after a certain time, by a full evacuation. Sometimes the call was so urgent, that it became necessary to discontinue the galvanic process. Dr. Abercrombie, in commenting on this case, says, that a portion of the intestine was in a state of over-distension and inaction; that galvanism affected this part by restraining its muscular action; and that the canal then recovered its healthy relations.

"Here, then, is a safe, gentle, easily applied, easily regulated means of acting on the bowels to any required extent, whether the intention be to produce brisk evacuation, or to imitate the process of nature. Such, I apprehend, will be the effect of employing a greater or less number of plates. This mode of effecting an important object, and for which so many contrivances, mechanical and medical, have been made, will, no doubt, one day or another, be duly appreciated, and, when simplified, will become as popular as mesmerism, or the 'domestic machine.'"—*Dublin Medical Journal, Feb.* 1847.

"Costiveness in the bowels," says Sturgeon, "however obstinately it may resist the usual remedies, very soon yields to the galvanic treatment; and by a similar process, constipations generally may readily be vanquished."—*Sturgeon's Galvan.*, p. 112.

The following is an extract of a letter from Catharine M. Noe, dated:

"Avon Springs, Livingston Co., N. Y., Nov. 27, 1849.

"Dr. S. B. Smith—

"Dear Sir: I have one of your premium magnetic machines, which I have used daily for three years and a half. The little thing has accomplished wonders, both in my own family and out of it. We have a family of six children, two of whom were unhealthy, and during the time we have had your machine we have never been obliged to call in a physician, nor even give one grain of medicine. I have always found that I could put action in the bowels, and produce the desired effect without difficulty. I have cured some of the most inveterate cases of costiveness. One of our boys, aged twelve years, was taken very severely with the pleurisy, and violent cramp pain below his heart; it seemed to affect his lungs: he could scarcely breathe. In the night I overheard him exclaiming, 'Oh, mother, I shall die!' I immediately ran for the machine, and applying it for a few minutes, he said, 'Mother, I am better!' In about an hour I blew out the light, and left him.

"If any thing is the matter with my children, the first thing I hear is, 'Oh, mother, will you magnetize me?' I might detain you for hours by telling you what I have done in my own family with your wonder-working machine. This is my motto which I use daily: 'If I was offered all the gold in California, I would not part with the machine, if another could not be obtained. What is gold without health?' I can say it has thus far proved a blessing to my family and neighbors, and, I may say, hundreds of others, far and near.

"Yours, etc., CATHARINE M. NOE."

For constipation, the operator begins by taking hold of the conductors, one in each hand; then, applying the conductors to the back and abdomen, he passes them downward over the breast and bowels, during fifteen or twenty minutes, according to the urgency of the case, the positive or left conductor being used for the bowels, and the negative for the back; power moderate. Then vary, by passing the conductors slowly downward on each side of the abdomen, with a strong power;

then reverse them for about the same length of time. After this, let the patient's feet be put into water as warm as he can comfortably bear it, then pass the left conductor slowly from the pit of the stomach downward, and in the same way all over the bowels, during ten or fifteen minutes longer. Operation once a day.

AMAUROSIS AND SPINAL COMPLAINT.

"In disease of the eye," says Donavan, "the application of galvanism has been of the greatest service; there are many cases of cure on record, but I have only room for a few of the more important.

"A lady aged thirty, lost the sight of her right eye, having been previously afflicted with severe headaches. M. Rossi being consulted, concluded that the disease was amaurosis, and sent her to M. Vassalli Eandi to be galvanized. The latter caused the galvanic current of thirty pair of plates to enter very near the external angle of the eye, and to issue sometimes at the eyebrow, sometimes at the ophthalmic branch which passes through the supra-orbital foramen, and sometimes very near the internal angle of the same eye. After an hour of successive shocks, the eye began to see a little better. The operation was then suspended till evening, when it was repeated for thirty minutes. Next day the eye began to distinguish the outline of bodies. The operation having been repeated for three successive days, the patient was not only able to see objects, but countenances, and even the pupils of the eyes.

"M. Vassalli Eandi relates a case in which a young lady, laboring under formidable paralytic symptoms, the eye being engaged along with the other parts, was completely relieved after two applications of galvanism, of ten minutes each, in two days, one intervening.

"In Germany, many cases of amaurosis, cured by galvanism, have been reported in the journals; some also of anosmia (loss of the sense of smell). In the latter, the conductors were put behind the ear.

"By directing electricity across the nerves of the orbit, M. Magendie has effected a cure of amaurosis that resisted the most powerful means that surgery could then employ, such as blisters, moxas, etc. This method ought to be more efficacious than any other, since the remedial agent acts directly on the nerves."—*Dublin Quarterly Journal of Medical Science for May*, 1847.

"John Chipman, of Hammond Street, was not able to distinguish a lighted candle at night. In the course of a few months, by applying the machine, he was enabled to resume his trade of painting.

"WILLIAM MILLER, No. 344 Broome Street, N.Y."

The following remarkable case of Mary Hester Hill, residing No. 64 Bleeker Street, Newark, N. J., aged seventeen years, was treated electro-magnetically by Dr. William Miller, No. 344 Broome Street, New York:

12th Mo. (December), 1849.

The following I penned down as related to me a few days ago, by the mother of the young woman.

"About five years ago, her daughter was afflicted with the spinal complaint, which gradually became worse and worse, until, about two years since, her eyesight began to fail, until eventually she became totally blind, so much so that she could not distinguish between daylight and night.

"After having been operated on with the Electro-magnetic Machine one week, she began to distinguish the day from the night; and after being operated upon for three weeks, she could clearly discern light from darkness.

"After being operated on a week longer, she began to see. At first her sight continued no longer than about a minute, when she relapsed back again into total darkness. At the next operation, her sight was again restored during about two minutes, and then was lost again for twenty-four hours. At the subsequent operation, her sight returned during four minutes, and was lost again about two days.

"At the next operation, she saw during about two hours and a half, and was blind again fifteen hours. After this she was operated on, and saw seven hours. At the next operation her sight was restored during two days; since which time she has not lost her sight except about half an hour.

"When she commenced the electro-magnetic treatment, her spine was very much affected, and her right shoulder was considerably enlarged. She was unable to sit straight, and was so debilitated, that a great part of the time she was confined to her bed. Her appetite was also was very poor."

Her spine, which I have seen, is now straight, and her sight is excellent, with the exception of the half-hour's occasional relapse, above mentioned.

She is now so far recovered as to be able often to walk half a mile. She is still under the electro-magnetic treatment; and there is every reason to believe that a full and permament cure will be effected. Her sight is now entirely restored, and continues permanent, 2nd Mo. (Feb.)

Her mother informs me, that, previous to the electro-magnetic treatment, her daughter had been under the most skillful physicians.

I would observe that Dr. Miller uses none but the Torpedo Magnetic Machine.

The following cure of blindness is extracted from a letter from Charles Reading, M.D., dated—

"Angola, Steuben Co., Indiana, April 4, 1848.

"I restored a gentleman to his left eyesight, who had been blind about one year, by a single application of your Torpedo Magnetic Machine. Respectfully yours,

"CHARLES READING, M.D.

For amaurosis, let the right conductor be placed on the back part of the head, between the organs of Amativeness, that is, just at the upper

extremity of the neck. Then let the operator (holding, as usual, the left conductor in his left hand) apply the ends of two of the fingers of his right hand to the patient's eyeballs, the lids being closed; power light, during three minutes. Then vary, by placing the right conductor under the feet, during two or three minutes longer, once a day.

SPINAL COMPLAINT.

The following is from Dr. Samuel Carpenter, 146 Wickenden Street, Providence, R. I.:

"WEBSTER, Mass., Aug. 28, 1848.

"Some of the most inveterate cases of spinal disease have yielded to the Torpedo, after having been of five, fifteen, and even forty years' standing. SAMUEL CARPENTER."

From Catharine M. Noe:

"AVON SPRINGS, Livingston Co., Jan. 17, 1850.

"I cured a boy of eleven years of age with your Electro-magnetic Machine, of a most distressing spinal complaint. His spine was very much curved, and pressed his lungs out of their place; his head bent back, his shoulderblades stuck out, and his back, near his loins, was as crooked as the letter S; he was pale as death. He was hurt when he was three years old. I cured him in five weeks. Dr. Fleming examined him; and in a lecture I heard him deliver in Avon village, he dwelt considerably on his case. He has since grown so astonishingly, that no person could perceive any thing about him that was ill-shaped. He is a stout boy at present, and attends the school at Avon. I could write you almost a volume of the cures that I have made with your machine. C. M. NOE."

For lateral curvatures of the spine, let the right conductor be applied to the posterior part of the curve, or that part which is swelled, and the left conductor to the atropied, or emaciated part. We will suppose, for instance, that the spine curves toward the right shoulder. Under this circumstance, the spine in the lower part of the back will be found to be curved toward the left. Let the operator then commence by applying the right conductor to the right shoulder, all over the raised or swelled muscles, and the left conductor to the left shoulder, and to the back between the shoulders. Then vary, by applying the right conductor to the posterior part of the curve in the lower part of the back, that is, to the left of the spine, and the left conductor to the opposite part of the back; power moderate, from half an hour to an hour. In this disease the power is to be gradually increased as the patient can bear it; once a day.

In other diseases of the spine, the right conductor to be placed under the feet, and the left one to be passed down the whole curve of the spine

In diseases of the spine, the liver should also be operated on, by applying to it the left-hand conductor, the right one under the feet, during about five minutes; power moderate.

SORE THROAT (*CYNANCHE*).

Under this head, I include the croup, the quinsy, inflammation of the pharynx, of the œsophagus, the mumps, and the putrid sore throat.

The electro-magnetic treatment for the above species of the disease is the same. Begin by applying the right and left conductors to different parts of the throat externally, so that there may be a diffusion of the current through the parts generally. Terminate the operation by applying the right conductor under the feet, and the left to the parts affected; power quite moderate, from five to ten minutes, once a day.

DROPSY.

The undersigned patient, Sarah Sanger, when first put under the electro-magnetic treatment, was so debilitated as to be unable to walk without assistance. Her dropsy was anasarcacal, from the ankles up to the part of the spine where the injury was received; the rest of the body was considerably emaciated, and she was sinking rapidly, wasted away by hectic fever and night sweats.

The following lines were written by her several months after she was restored to health:

"New York, Aug. 3, 1846.

"I was grievously diseased with a dropsical swelling, jaundice, and contraction of my left leg, owing to a fall which severely wrenched my back, and the interior part adjoining. I called in two physicians, but my health continued to sink rapidly away, so much so, that they told me they could do no more for me. In this state, I heard of Dr. S. B. Smith's Electro-magnetic Machine, and by the use of the machine about two months, I was restored to health. If my name can be of any service to Dr. Smith, he is very welcome to it, as I firmly believe had it not been for his machine, I should now have been in my grave. SARAH SANGER, 154 Delancy Street."

ANASARCA.

For the dropsy (*ascites*) there must be a general application of the machine. Let the right conductor be placed under the feet. The operator then, holding the left conductor as usual, passes his right hand down the patient's back, over the stomach, liver, bowels, and down the legs; power moderate, from twenty minutes to half an hour, once a day.

The application of electro-magnetism in this manner, generally promotes a diaphoresis, which, in this disease, is peculiarly beneficial. In some cases, and especially at the commencement of the treatment, the perspiration is not always easily excited.

The diet of the patient should be nutritious, and he should take as much exercise as he can bear without fatigue.

DEAFNESS AND DISEASES OF THE EAR.

Deafness of Fifteen Years Cured.

NEW-YORK, *April* 26, 1847.

The following is from Dr. Wm. Miller.

Dr. S. B. Smith: Dear Sir—I will give a statement of a case which has just come under my notice. Mr. Thos. L. Rhodes, residence cor. 22nd St. and 3d Avenue, contracted a deafness of both ears in 1832, from cold. He could not hear a gun fired close by him, nor the explosions from the blasting of rocks, some four hundred yards from his place of labor, unless more than a keg of powder was used at a blast. This state continued till a few days since, when he was, with one application of the Electro-Magnetic Machine, so completely restored, that he can hear conversation in an ordinary tone when distinctly uttered.

Loss of Smell, Deafness and Cough Cured.

Noah Hudson, of Walnut-street, Newark, N. J., says—"I have received more benefit from the use of the Electro-Magnetic Machine than from any thing I have ever used. It restored my sense of smelling, which was entirely lost; and the hearing of one ear, in which I had been deaf for a long time. It gave me relief from a troublesome cough and affection of the chest, that had been considered a hopeless case. I now consider myself well."

For Deafness and other diseases of the ear, let the patient hold the negative conductor in his hand. The operator should then take the positive conductor in his right hand, holding the metallic part of it between his thumb and fore finger. Let him, while holding the conductor in this manner, introduce the ends of his two little fingers into the patient's ears. Power light, during three minutes, once a day.

NOTICE TO THE READER.

In all electro-magnetic machines which run with the vibratory motion of a spring, there is more or less noise made by the rapid motion of the spring. Instruments which are not well constructed, and which are liable to get out of order, will have a feeble sound, whereas a good, strong instrument, capable of always running well, will proportionably have a louder sound. To weaken this sound in the Torpedo, cut a piece of soft newspaper two or three inches long by about an inch and a half wide, bend this at half an inch from the end, at a right angle, and introduce it between the end of the magnet and the little iron hammer on the end of the spring, one part of the paper laying alongside the large post and the morocco of the helix.

I shall now conclude the *particular directions* for applying the to-and-fro current electro-magnetic machines. I think the directions already given will enable any one to form a correct idea of how the instrument ought to be used in all other cases.

N. B. Since publishing the first edition of this work I have found that my MAGIC SALVE is of far more extensive utility than I anticipated. It is used with great success for cramps, dyspepsia, rheumatism, and diarrhœa, by rubbing it in during ten or fifteen minutes. Also for diseases of the ear, by introducing a few drops internally.

I would here observe, that the right hand Conductor of the Torpedo is more energetic than the left.—In the instructions for applying the instrument, I have generally, as will be seen, directed that the left Conductor be applied to the parts diseased; this being much milder in its operation. After applying it in this way a few times, it will be found advantageous to reverse it, and to apply the right Conductor where the left one had been applied, that is, *vice versa*. In Paralysis, however, on p. 57 and 58, the Conductors are not to be varied from the manner there directed.

Extracts from Letters.

PROTRACTED CASE OF PULMONARY CONSUMPTION CURED.

Extract of a letter from Dr. H. J. Capp, dated SUNCOOK, N. Hampshire, June 18, 1852.

"DR. S. B. SMITH: Dear Sir—I have done wonders with your Torpedo Magnetic Machine, but I will trouble you with the particulars of only one case at this time. My wife has been consumptive for seven or eight years, and troubled with Scrofula, both hereditary in her father's family. Last winter she had a slow fever, and was very sick, and to all appearance, after the fever left her, was sinking away in a rapid Consumption. She raised thick pus-like matter, yellow, and sometimes bloody. She was so low that I had to put my arms under her, and lift her off and on to the bed to have the bed-clothes changed; and some of the time I had to move her limbs in bed, for she was entirely too weak to do it herself. I had your machine in the house, but almost feared to use it, as she was so weak. Her friends said that she could live but a few days in that condition, and having practised medicine a number of years, I was well aware of the truth of what they said, of the dreadful fact that she must die. I therefore took the Machine, made an examination, and found the left lung very much diseased. I used it for 15 minutes. The next day she was better. I used it again, and I have the pleasure of informing you that in a few weeks she entirely recovered, and now at this time, her health has not been so good for eight or ten years. She calls herself well—completely recovered. She commenced to recover, and kept gaining from the very first day that I commenced to use the Machine; and now as a physician I do not hesitate to recommend the use of your Torpedo Magnetic Machine in all nervous diseases, and in all Pulmonary Complaints. My wife, before her sickness was very nervous, and she is scarcely at all so now. She is improved every way.

Any person calling upon me, or writing to me shall receive all the information they wish in relation to the cases I have had, and cured.

H. J. CAPP."

DISEASE OF FIFTEEN YEARS CURED.

"I am rapidly recovering by the use of your Torpedo upon a 15 years disease, and have cured a case in this neighborhood worthy of record.

York, Penn., October 3d, 1852. E. HARMON."

ST. VITUS' DANCE—RHEUMATISM.

"A young lady severely afflicted with St. Vitus' Dance, has been effectually cured by your Torpedo Magnetic Machine in 30 days.

Also a lady about 50 years of age who had been afflicted with Rheumatism 8 years, was cured with nine applications of the Machine. I could name many more cases, but must be brief. I have used your Torpedo in my practice about two years, and from experience can say, that when properly applied, it is the best remedial agent I have found.

Wakefield, R. Island, Oct. 13, 1851. Dr. S. B. McCullen."

SALT RHEUM IN ITS WORST FORM CURED.

"Dr. S. B. Smith—

Sir:—About three years ago I purchased one of your Torpedo Magnetic Machines, to apply to myself for Salt Rheum in its worst form. Your machine has cured it. Since which time I have cured a hundred and ninety different cases, and out of the whole, have failed in but one instance.

Danielsonville, Conn., July 16, 1852. Sarah Bicknell."

SALT RHEUM OF TWENTY YEARS STANDING.

"I was afflicted with Salt Rheum for twenty years, and was cured by your Torpedo in three days. It has now been four months, and I have had no return of the disease since. I am in better health this spring than I have been for many years, which I attribute wholly to the use of your machine.

Angelica, N. Y., May 20th, 1851. Dr. Samuel Van Wickle."

CURES IN MICHIGAN.

"Your Torpedo is performing wonderful cures in this neighborhood. The operator charges twenty-five dollars for each cure.

Bertrand, Mich., Dec. 28, 1850. S. W. King."

NERVOUS DISEASES—ST. VITUS' DANCE—EPILEPTIC FITS OF TWENTY YEARS STANDING.

"A patient confined to bed with nervous disease, was cured by a few applications of your Torpedo. A girl also who was given up to die with St. Vitus' Dance, was cured by four operations of your machine, and another of the same disease of two years standing, was cured by five operations.

A distressing case of Epileptic Fits of twenty years standing.—George Crane of Martinsville, Indiana, aged 43 years, has had Epileptic Fits over twenty years. I began to operate on him with your Torpedo Magnetic Machine in March, 1850, and since April 1, up to this time, 15 months, he has had no Fits, nor even symptoms of any. His reason was much impaired, of which he is gradually recovering. His health was so poor

that he was unable to work ; now his general health is good, and he works regularly.* No other means were used but the machine. I have a list of other equally remarkable cures effected by your Torpedo.

Nashville, Indiana, July 1, 1851. C. MORLEY."

INFLAMMATION OF THE LUNGS—TYPHOID FEVER—INFLAMMATORY RHEUMATISM.

"I have been using your Torpedo Magnetic Machine for the last year, and I must say that language is too feeble to describe the virtues contained in it in curing diseases.

I have cured with it a case of Inflammation of the Lungs, and raised the patient from the point of death. The cure was thought a *miracle*. I have cured severe cases of Typhoid Fever, Inflammatory Rheumatism, and Neuralgia with your Torpedo. These are only the drop of a bucket to what I could send you did time allow.

Avoca, N. Y., Dec. 12, 1852. DR. T. A. STEWART."

VALUE OF THE TORPEDO.

"I would not take $50 for your Torpedo if I could not get another.
Oil Mills, Ky., Sept. 20, 1850. J. G. BRAUGHTON."

"If every Doctor in North Carolina would promise to attend to me and my family free of cost, if I must give up the Torpedo, I would reject the offer.

Smithfield, North Carolina, June 19, 1852. D. MCPHERSON.

"I would not be without your Torpedo at a cost of $100.
Avoca, Steuben Co., N Y., Dec., 15, 1852. JOHN D. GRISWOLD.

"I have used your Torpedo in my practice two years, and from experience can say, that, when properly applied, it is the best remedial agent I have found.

Wakefield, R. I., Oct 13, 1851. DR. J. B. MCCULLEN.

"Nearly all the physicians in this region have some sort of a machine. Some of one make, and some of another ; but all who have seen yours, have expressed a decided preference for it.

Kennebunk, Me., Feb. 25, 1848. S. C. REDLON."

"Dr. B. Smith, Sir.—In answer to your inquiry of me, what I thought of your Torpedo Magnetic Machine, I assure you that it far surpasses any Electro-Magnetic instrument we have ever tried. I find it free to run, and have never known it to be out of order. Dr. William Miller, 347 Broome street, N. Y. Sept. 14th 1847.

* In Fits and all Nervous Diseases, the patient, when in bed, should lay with his head to the North or East ; never to the South or West.

THINGS CAN BE PERMANENTLY MAGNETISED.

It is strange, indeed, in this enlightened age, to hear of people who deny that substances can be permanently magnetized, when the fact is continually staring them in the face of the magnetic virtue that is imparted to iron, and that it is by means of this virtue in the mariner's compass that he navigates the ocean. Let me ask these people whether they have ever seen a person in the mesmeric sleep or influenced psychologically? Let them examine their limbs—they will see them perfectly rigid—try their muscular powers and they will find them endued with a strength apparently miraculous. I have seen a boy in this magnetic condition, not more than fifteen years of age, and of a slender frame, raise a heavy man sitting in an arm-chair from the floor, by taking hold of the two back legs of the chair with his hands, and this too, while two strong men were endeavoring to keep the chair to the floor. In the operation, and by the force employed, the chair, which was a strong one, was broken to pieces. This was done in Clinton Hall in this city, and the chair that was broken belonged to the Clinton Association, and not to the operator.

There is the magnetized buff lately invented, and now introduced among daguerrians. By means of this buff, which has a magnetic virtue imparted to it, the plates, on which the likenesses are to be taken, are gently rubbed before being submitted to the action of the solar rays. In consequence of a permanent magnetic virtue imparted to the plates by this operation, likenesses, it is said, can be taken in half the usual time.

Lastly, out of the same ingredients I will make two portions, one shall be magnetized, and the other shall remain in its natural state. The virtue of that which has been magnetized will be double that of the other, as will be demonstrated by the effects.

I have had patented a machine with which I magnetize medicines, which any one interested in scientific inventions may have the liberty of examining.* This instrument is not made for sale, as it is complicated in its construction, and considerably expensive. It is kept for my own use, but will be submitted to public inspection at the Great Fair to be held in this city the present year.

I have a Salve which has been submitted to the magnetic process, the efficacy of which, I think, will convince any unbiassed mind that it possesses most extraordinary virtues. Now, I will take the same ingredients of which this Salve is composed, unmagnetized, and apply it, and the difference will be apparent to any one: hence I have denominated it the Electro-Magnetic Magic Salve. This invaluable article will be found to be peculiarly efficacious in all sorts of

Sores, Cancers, Scrofula, King's Evil, Fever Sores, Salt Rheum, Carbuncles, Boils, Tetter, Scald Head, Felons, Bruises, Cuts and Wounds, St. Anthony's Fire, Piles, Fistula, Ague in the Breast, Ring-worm, and in curing Inveterate Sores of many years' standing.

The Salve is put up in tin ounce boxes. Retail 25 cents. Any one at a distance wishing to test the value of the Salve, can have it sent by mail to their address to any part of the Union; the postage on it prepaid being only 12½ cents. To those at a distance wishing to try the Salve, I will put it at 25 cents a box, and pay the postage.

---

* Patented June 4, 1850

THE DIRECT AND TO-AND-FRO CURRENT

ELECTRO-MAGNETIC MACHINE,

INVENTED BY DR. S. B. SMITH, A.D., 1853.

(*Patent applied for.*)

This is an instrument which gives out both the *Direct* and the To-and-fro Galvanic Currents, just as may be desired, which no instrument has ever done.

In consequence of this peculiarity, the galvanic currents can be imparted so as to produce effects which no other Electro-Magnetic or Galvanic apparatus is capable of performing. In order to set the subject in a clearer light, I would observe that the To-and-fro, or secondary electro-magnetic current, is a current which does not come directly from the battery, but is a current proceeding from the direct current by induction, and from which it is separated by the wires conveying the two currents being completely insolated by the cotton or silk with which they are covered.

The primary current, on the contrary, is the current which is generated in the battery, and which proceeds directly through the wires forming the coil or helix of the instrument.

At each time that the primary current is interrupted by means of a spring adapted to the purpose, the secondary current is affected, and is put into a *to-and-fro* motion, the primary current still continuing its *direct course.*

We will now examine the characteristic differences of these currents. In the first place they are both medicinal in their effects. The two extremities of a battery are called *Poles;* the one *Positive,* and the other *Negative.* In the direct or primary current these two poles have a specific action. In the secondary current this specific polar action is wanting. This constitutes the difference of the medicinal effects of the two currents.

The primary current is a powerfully *chemical current;* the secondary, or To-and-fro current, is not so.

The secondary current has *no permanent poles,* as they alternate, or are reversed at each time the primary current is broken.

Such being the characteristics of the two currents, it is but reasonable to expect a corresponding difference in their medicinal effects, and such difference is found to exist.

The positive pole of the direct current is powerfully expansive in its action: the negative pole is as powerfully contractive and tonic. The positive pole dissolves metals, and the hardest substances, even the diamond. The negative pole, by its contractive powers, revives and consolidates them again. How beautiful is the experiment to see a

piece of gold in a solution of the cyanide of potash, suspended from the positive pole of a galvanic battery, or of the instrument which I have invented, dissolved, and mixing with the solution, as completely as a lump of sugar would be dissolved in water! Then, again, to see that gold revived, and brought back to its solid state by introducing some metalic substance suspended in the solution on the negative pole!

In considering the decomposing powers of this wonderful agent, the mind is almost lost in wonder and admiration. It is already known to possess the powers of decomposing a vast number of substances, and, probably, the time will come, in the progress of science, when it will be found that *everything* in nature may be dissolved by it.

As it is the To-and-fro current electro-magnetic machines that have generally been used in the United States, it will require some time and practical experience to know all the cases in which the direct current is preferable to the To-and-fro. On this subject, however, there are some general principles which may determine when the direct current should be used. I would, therefore, here observe, that the *direct current* should be used, 1st, whenever a tonic action is required, or its opposite, an expansive or dilating action.

2dly, Whenever it is necessary that a direct course of the galvanic current should be administered. Under the first head it will be pre-eminently useful in midwifery, in cases of atonic state of the womb, and flooding.

It should be used in tumors; the negative pole to be applied round about the tumor, to promote suppuration, and the positive pole to be applied to it when it is desirable to disperse or resolve the tumor.

The direct current should be used in dyspepsia, and other diseases of the stomach and intestinal canal. In dyspepsia the positive pole should be placed on the pneumogastric nerve on the sides of the neck, and the negative pole passed over the region of the stomach. In constipation of the bowels, a gentle current should be passed from the tongue to the anus; the positive pole placed on the tongue, and the negative introduced into the anus. This is to be done with instruments appropriate to the purpose. As an auxiliary in this case, the to-and-fro current may also be used in the manner mentioned on page 74.

Stone in the Bladder.—I have an instrument made expressly for introducing the direct current into the bladder. It is so constructed that, by means of a spring, passing through a catheter, the ends of the two poles are brought to bear upon the stone, and by their action to dissolve it.

To lull Pain.—The positive conductor should be placed above the seat of the pain, and the negative an inch or two below it. The positive conductor should be raised but seldom during the operation. Generally, however, in the treatment of disease, the positive conductor should be moved about continually, and raised frequently.

As the direct current is very decided in its effects, the practitioner should proceed with caution, and, as it were, feel his way gradually in applying it. It will, therefore, be advisable always to commence with

a moderate power, and continue the application for a much shorter time than is prescribed for the application of the to-and-fro current.

CASES OF PARALYSIS.

Treated by Golding Bird, Professor of *Materia Medica* in Guy's Hospital, London. Extracted from his "Electricity and Galvanism," p. 161–166.

"A barrister, in large and influential practice, became the subject of paralysis of the portio dura on the left side, from exposing the cheek to a current of air from a broken window in a crowded court. He applied to me in a week or two afterwards, the paralysis continuing, and the distortion of the face hideous. As his general health was excellent, I ordered him to apply the currents of an electro-magnetic machine to the paralysed cheek for a few minutes daily; this was done for him by his servant, and in a fortnight all distortion vanished.

"An instance lately occurred to me in the person of a clergyman, who had suffered from paralysis of the seventh pair of nerves a dozen years previously, and the paralysis had never completely disappeared; the face when I saw him was not symmetrical, the saliva often flowed from one corner of the mouth, and his intonation was impaired. He set sedulously to work with the electro-magnetic current, and I saw him some months afterwards perfectly restored.

"*In paralysis following local injury*, the aid afforded by electricity depends upon the nature of the injury inflicted. If a blow, or other applied violence, has been sufficient to injure the structure of a nerve, no benefit can accrue, or, indeed, can be expected, from the use of electricity. But if, on the other hand, the paralysis has been merely the result of concussion of the nerves, &c.,—of some pressure which, although severe, did not disorganise the nervous fibres,—the remedy in question is often of service. In such cases I would advise the application of electro-magnetism from the *single current machine* * (described in my last lecture) to the paralysed limb, taking care to transmit it in the course of the *vis nervosa*, or, in other words, in the direction of the nervous ramifications. I think I have seen benefit thus obtained in the weak and feeble state of a limb following other forcible reductions of a dislocation; as of the head of the humerus into the axilla.

"In hysterical paralysis, where the affection, however excited at first, is now uninfluenced by the patient's will, there are few curative remedies so important as the electro-magnetic current. I have seen a young woman, the subject of hysterical paraplegia for months, move the limbs, and walk, although unsteadily, in an hour or two after the application of electricity; and, very lately, another was in Guy's Hospital under my care with paralysis of the right arm, in which the same successful results occurred.

* This is the term he uses when speaking of his *Direct Current Machine*.

"In connexion with these cases, I may now allude to the voicelessness we occasionally meet with in cases of hysteria. This is often a troublesome symptom difficult to relieve. In the majority of cases this does not disappear until the anæmia, if present, is cured, and the general health restored as completely as possible. Even then, however, the aphonia will frequently baffle us. In such cases I have been often gratified by the result of the application of electricity. Sometimes, on seating the patient on an insulating chair, connecting her with the prime conductor of the electrical machine, and drawing sparks briskly from the region of the larynx, the voice has almost immediately returned. In one case, which had been peculiarly obstinate, passing a gentle current from the electro-magnetic machine through the larynx, and only for a few minutes, cured the patient.

"There is another form of paralysis by no means unfrequent in practice, dependant upon, or at least connected with, general anæmia, and accompanying enervation, and in which the sole appreciable cause of the want of power in the palsied limb, is an exhausted state of the great nervous centres. Such a condition we see occasionally in women suddenly exhausted by flooding labor, or more gradually drained of vigor and power by the more insidious effects of over-lactation, and sometimes merely leucorrhœa. It is perfectly true that the judicious practitioner can successfully treat these cases, first by arresting the drain upon the system, if such continues, and then by building up power by good food and hæmatic tonics, especially preparations of iron. But if the want of power in the limb has been at all chronic, the palsied state by no means necessarily disappears *pari passu* with the restoration of general health. Time, and often a very long time, becomes an element in the restoration of the limb to its due allegiance to the will. In such cases the cure may be very remarkably expected by the stimulus of electricity. One of the first cases in which I adopted this addition to our treatment occurred many years ago in the person of a lady (since dead from phthisis) whom I saw with my friend Mr. Pretty, of the Mornington-road. This lady, always of weak power, had been completely exhausted by suckling her infant, and gradually and insidiously she lost power in the left arm. When I saw her, this had amounted to nearly complete loss of sensation and motion; the latter function being, however, most deficient. Under judicious management her general health had been much restored, but her arm remained useless. Believing that there was no organic disease, and regarding the state of the limb as one merely of deficient power, I suggested the application of a current from the alternating electro-magnetic machine down the arm, one conductor being placed over the cervical spine, the other being placed in a basin of warm water in which the left hand was immersed. The result was very satisfactory: almost after the first application some little power returned, and by the daily use of the current the patient recovered, in a few weeks, complete power over the limb."

THE EFFECTS OF GALVANISM IN UTERINE HEMORRHAGE.

"The influence of galvanism on the uterus," says M. Donovan, "is well worthy the attention of practitioners. The efficacy of this agent in inducing contractions of the fibres of the uterine tissue, in cases of severe flooding, has been shown by Dr. Radford, of Manchester. Circumstances inducing him to anticipate that such contractions would lessen those large venous orifices which are exposed by the separation of the placenta, and bring the walls of the uterus into firm apposition with the body of the child so as to entirely close them, he was soon enabled to prove the correctness of those views by being called to a case of frightful hemorrhage during labor, attended with extreme exhaustion. By this case he ascertained that galvanism produces a powerful contraction of the uterus, both tonic and alternate, such as he had previously no conception of. The alternate contraction excited by galvanism, applied at intervals, is analogous to, and as powerful as that which is observed in normal labor, and the tonic contraction is greater. He applied galvanism in a case where the membranes were unruptured, and the uterus in a state of great inertia; alternate contraction was immediately produced; the membranes, previously flaccid, became tense, and protruded low down into the vagina; and when the conductors were removed, so great a degree of tonic contraction of the uterus had been induced, that it could not collapse. Thus, in cases of exhaustion from hemorrhage, the woman can be placed in such a state of safety, that delivery may be postponed until it can be safely accomplished, and meanwhile measures may be taken to raise the vital powers. Dr. Radford also suggests the employment of galvanism in other cases of uterine hemorrhages, which he fully describes."

CAUTION TO THF PUBLIC,

OR TESTS FOR DISTINGUISHING A DIRECT CURRENT FROM A TO-AND-FRO CURRENT ELECTRO-MAGNETIC MACHINE.

I have understood that certain manufacturers of Electro-Magnetic Machines, anticipating the important results to be obtained by the *Direct Current*, have reported that their machines (the to-and-fro current) are direct current machines. In order to put the public on their guard against such an imposition, I will here give the tests whereby a direct current machine can readily be distinguished from the to-and-fro current. The first test is with the galvanometer, the second, with the iodide of potash, the third, by electro-plating, the fourth by connecting the two poles of the instrument by means of a wire, and lastly, by magnetizing iron.

To perform the first, connect the two poles of a *direct current* Electro Magnetic Machine with the galvanometer, and immediately it will deflect the needle ninety degrees, if the galvanometer be well constructed, or to near ninety if it be made with a mere pocket compass.

To perform the second, moisten a piece of white paper with a solution of iodide of potash, then take two platina wires, or two pieces of copper wire with platina points, and having attached one end of these wires to the two poles or posts of this *direct current* machine, bring the other ends with the platina points, in contact with the iodized paper, at a short distance apart, and immediately the point under the end of the wire in connection with the *positive pole*, will be stained with a *purple color*, no stain or mark appearing at the end of the wire in connection with the *negative pole*.

In regard to the third, I refer to the directions I have given on Electro-plating.

To perform the fourth, bend a piece of wire and connect the ends of it with the two poles of the *direct current* machine, and immediately the operation of the machine, and the motion of its spring cease.

To perform the fifth, wind a piece of copper wire around a small bundle of iron wire to the thickness of four layers, and connect the ends of this copper wire to the two poles of the machine, and the iron will be found to be magnetic, having a north and south pole.

With a *to-and-fro* current machine, no such effects will take place. Under the operation of the first test, the galvanometer will remain with the needle still pointing to the north.

Under the operation of the second test, the iodized paper will be stained at *both points* of the platina wires.

For the information of those who are not fully acquainted with the subject, I would here observe that the iodine is invariably liberated at the place where positive electricity enters the body containing it. Hence we have, in this experiment, a proof, that, in the to-and-fro current machines the poles alternate or change at each vibration of the spring, or interruption of the galvanic current.

Under the operation of the third test, the action of the *to-and-fro* current is null and void—*no plating* is effected.

By the operation of the fourth test, the to-and-fro current machine is entirely unaffected, the motion of it, and the vibration of the spring still continuing uninterruptedly.

Lastly, the *to-and-fro current* has NO MAGNETIC POWERS, because the iron submitted to its action, *remains unmagnetized.*

Such being the vastly different effects produced by the Direct and To-and-fro current machines, we must of course look for vastly different powers and results in their medical application; and such is found to be the fact.

PROCESS OF ELECTRO-GILDING AND PLATING.

Pour the solution of gold or silver into a tumbler, or any glazed stone-ware vessel, and suspend in it on the end of a copper wire, the article to be gilded or plated, the other end of the wire being inserted into the negative post of the Direct end of the "Direct and To-and-fro Current Machine." If the article is to be gilded, suspend a gold dollar in the solution, on the end of a platina wire inserted in the positive post of the Direct end of the instrument. Connect the instrument with the battery, and immediately the gold deposit will commence on the article in the solution. If silver plating is to be done, the silver solution is to be used, and a twenty-five cent silver piece, in place of the gold dollar.

The articles to be gilded or plated should be thoroughly clean and bright before being immersed in the solution; and during the operation they should be taken out every twenty minutes, and brushed with a hard tooth-brush and whiting. A good thing to clean with is chalk and alcohol. A piece of buckskin will be wanting, and a jeweler's fine brush; also for the gold a little jeweler's rouge. The longer the articles are submitted to the process, the thicker will be the gold or silver coating. A great advantage in the gold and silver solution I prepare is, that, by using, they do not lose their virtue; for the solution is kept constantly replenished by the galvanic action of the positive pole, which dissolves as much of the gold or silver coin suspended on it as the article receives in being gilded or plated. The only precaution that is necessary, is, when the solution is not in actual use, to keep it corked, and from the light.

PRACTICAL SUGGESTIONS IN GILDING.

(*From Napier's Electro-Metalurgy.*)

"According to the amount of gold deposited, so will be its durability; a few grains will serve to give a gold color to a very large surface. A mere blush may be sufficient for articles not subject to wear; but on watch-cases, pencil-cases, chains, and the like, a good coating should be given. An ordinary-sized watch-case should have from twenty grains to a pennyweight; a mere coloring will be sufficient for the inside. Small silver chains should have twelve grains; pencil-cases from three to five grains; a thimble from one to two grains," p. 318.

LEAVING OFF THE USE OF SPECTACLES,

BY THE USE OF DR. S. B. SMITH'S NEWLY INVENTED DIRECT AND TO-AND-FRO CURRENT ELECTRO-MAGNETIC MACHINE.

I have reason to believe that, by a certain mode of applying my newly invented machine, the visual focus may be brought to its proper distance from the retina, and thus the sight be restored to its original vigor and clearness: in other words, that the

USE OF SPECTACLES MAY BE ENTIRELY LAID ASIDE.

I will now, in a few words assign my reasons for thus thinking. A short time since I was experimenting with said machine, and trying the force of some shocks administered under circumstances entirely new, when, entirely unexpected by me, I found, that, on the ensuing morning I was able to read the finest print in the *Tribune* newspaper without spectacles. I had been wearing glasses about ten years, and, previously to this experiment, was unable to read even the editorial or larger sized print of the same paper. My sight is still improving, and if my business was such that I was not obliged to overstrain my eyes, I think I could *now* entirely lay my spectacles aside never more to resume them. It cannot be expected, however, that a permanent cure can be effected without perseverance.

The instrument is put up in neat Rosewood cases of a very portable size. Price $12.

SAMUEL B. SMITH,
No. 89 Canal Street, New York.

PRICES OF ELECTRO-MAGNETIC APPLIANCES.

Instrument for sounding the Bladder, and dissolving the stone,	$5 00
" for operating on the Stomach and Intestines, *per ore et ano*,	2 00
" for *internal* operations on the Uterus,	1 50
Galvanometer,	3 00
Permanent Magnets 4½ lbs. power,	2 00
Circular Electro-Magnets for entertaining experiments,	5 00
Gold Solution, per pint	3 00
Silver, " "	2 00

Treatise on the "MEDICAL APPLICATION of ELECTRO-MAGNETISM, by DR. S. B. SMITH," 4th edition, enlarged, with an appendix relative to his "Newly Invented" DIRECT and to-and-fro current Electro-Magnetic Machine—Octavo size—Printed on fine paper—Bound in figured cloth, 50cts.

Ditto in pamphlet form 25 "

DAGUERREAN LIKENESSES

TRANSFERRED BY DR. S. B. SMITH'S,

DIRECT AND TO-AND-FRO CURRENT

ELECTRO MAGNETIC MACHINE,

OR

GREAT WONDER WORKER!

LIKENESSES from Daguerrean pictures can be multiplied to any extent, and produced not only with the finest shades of the original, but with a softness of tone even surpassing it.

The process for performing this wonderful result is as simple as it is sublime. What seems almost incredible is, that the original likeness or picture suffers no injury by the operation.

The cost of a picture transferred in this manner, will not exceed two or three cents.

The process for performing the operation is as follows:—Suspend the picture from which a transfer is to be taken, in a large tumbler or any glazed vessel, in which is a saturated solution of common blue vitriol, (*sulphate of copper*). Let the copper wire on which the picture is suspended, be attached to the negative pole at the *Direct* end of the Direct and To-and-fro Current Machine; and attach another piece of copper wire to the Positive pole, and let the end of the wire dip down about half an inch into the solution of blue vitriol in which the picture is suspended, at about two inches from it: the wire to be about the size of a knitting needle. Put the machine now into operation in the usual way, as when used in applying it to the sick, and in a few hours there will be deposited on the face of the Daguerrean picture, a perfect *fac simile* in copper. When a sufficient thickness of copper has been deposited on the picture, it is to be taken out and washed. A narrow strip or shaving is then to be cut off from the edges of the picture, and the thin sheet of copper deposited on it is to be carefully removed. This is easily effected by peeling it off with a penknife. On this thin sheet of copper the likeness will be found to be transferred in inimitable beauty. The transfer can then be framed in the usual style. During the operation it will be better to pull the piston out of the helix.

CONTENTS.

PAGE.

Diagnosis of Disease 8
The Human Body physiologically acts on the principle of the Galvanic Battery 9
The Galvaniscopic Frog 11
Electric Current in Muscles 11
Influence of the Organic Condition of Muscle 12
Sources of Muscular Current 12
The Different Kinds of Electricity 14
Inefficiency of Frictional Electricity 15
An Experiment showing that Animal Matter, in common with Metals, is susceptible of Electro-polarization, negative and positive 16
The Nerves insulated—In all Matter a specific Electric Charge, with Different Degrees of Intensity 16
Peculiarities of Electric Irritation of the Nerves 17
Electro-biological Circuit 17
Electro-statics and Dynamics 18
The Electric Fluid Expansive in its passage 18
Some of the Wonderful Properties of Electro-magnetism 19
Effects of Galvanism on the Human System 20
Are the Nervous Force and the Electric Fluid identical? 21
No Effect of the Body can take place in its Animal Life without a corresponding Change of Matter 22
The Brain 22
The Negative and Positive Electric Power 23
Positively Electrical and Negatively Electrical Bodies 25
The Direction taken by the Metals, Acids, and Alkalies in the Voltaic Circuit. 25
The Decomposition of the Sulphate of Potash 26
Different Degrees of Electric Intensity in the Animal Body 26
Electric Action on the Fluids 27
The Properties of the Mind deduced from the Voltaic Structure of the Brain. 27
Electricity from Acid and Alkali in Muscle 27
The Cholera—its Relation with Electricity 28
Electricity in the Body in Three Different States 30
The Effect of Rotary Motion on the Magnetic Needle 30
Singular Fact in relation to Muscular Electricity 30
Remarks on Electricity by Brydone, during his Visit to Mount Etna 31
Different Directions of the Electric Current produce Different Effects 33
The Wonderful Powers of the Direct and To-and-Fro Current Electro-Magnetic Machine 2
Comparison between the Direct and To-and-Fro Current 85
When the Direct Current should be used 86
Cases of Paralysis 87
The Effects of Galvanism on Uterine Hemorrhage 89
Caution to the Public 89
Tests for Discriminating between a Direct and To-and-Fro Current Machine 90
Practical Suggestions on Gilding 91
Leaving off the Use of Spectacles 92

PAGE.

Instantaneous Moxa produced by Galvanism 34
The Electro biological Current exemplified in the Body of a Bicepalous Child 35
Electro-chemical Decomposition 36
The Phenomenon of Springs explained on Electric Principles 37
The Velocity of Electricity 39
Effects of Galvanism on the Dead Body 40
Electroscope—The Vital Electric Action on Different Animals—Different Polarities in the same Metal—An Experiment showing the Polarity of a Dry Pile—The Electric Current from the Feet to the Head—The Preferability of Electro-magnetism to Galvanism—Cause of Muscular Contraction 42
Electro-magnetism Medically Applied 43
Dr. Golding Bird on Electricity and Electro-magnetism 46
Manner of Running the Machine 47
Manner of Applying the Machine 50
Special Treatment of Diseases 53
Tetanus, or Locked Jaw 54
Affection of the Liver—Palsied Limbs—Neuralgia—Affection of the Heart—Paralysis 55
Rheumatism—Paralysis—Desperate Case of Rheumatism 56
Inflammatory Rheumatism—Paralysis 57
Poisoning by Cubebs 59
Strangulated Hernia 60
Bilious Complaints—Asthma 62
Amenorrhœa, or Retention of the Menses 63
Hydrophobia 64
Chorea, or St. Vitus' Dance—Headache—Epileptic Fits—Paralysis—Sciatica .. 66
Cholera—Barrenness—Impotence 68
Consumption—Scrofula 69
Epileptic Fits—Fever and Ague—Toothache 71
Hip Disease and Neuralgia—Reduction of a Huge Tumor 73
The Galvanic Influence, in promoting the Alvine Evacuations, Opens and Strengthens the Bowels 74
Amaurosis and Spinal Complaint 76
Sore Throat—Dropsy 79
Deafness and Diseases of the Ear. 80
Consumption 81
St. Vitus' Dance—Rheumatism—Salt Rheum—Nervous Diseases—Fits 82
Inflammation of the Lungs—Typhoid Fever—Value of the Torpedo-Electro-Magnetic Machine 83
Things can be permanently Magnetized 84
Electro-Magnetic Magic Salve—Patent Magnetic Machine for Magnetizing Medicines 84
Altering the ordinary Electro-Magnetic Machines into the Torpedo-Magnetic Machines 85
Medicines introduced exteriorly into the Body through the Nerves 85

SUPPLEMENTARY.

I would here state, that I manufacture the Direct and To-and-fro Current Machine, with *extra* appliances, such as the Instruments for operating on the Stomach and Intestines, *per ore et ano*, and for *internal* operations on the Uterus. Also, with an adjustment for exhibiting an interesting experiment, in the explosion of Gunpowder and Gun-cotton. This apparatus is also adapted to blasting rocks in a quarry, and by the aid of a short brass tube, can be used for blasting rocks under water.

Agents Wanted.

For the above instrument, which is a very important one and highly interesting, I want to establish Agencies throughout the United States, Canada, the West Indies, South America, and in other Foreign Countries.

I would therefore say, that, to those who will order, at least, six at a time, I will put them at eleven dollars each, cash. To clubs also, the same terms are offered.

They can be sent by Express to Canada, and to any part of the United States. In regard to remittances of money, those who prefer it can pay the amount to any of the Express Agents of Adams & Co, Harnden & Co., Wells & Co., Pullen, Virgil & Co., and Fargo & Co., of the City of New-York, who have Agents in all the principal parts of the Union, and in Canada. Persons wanting only a single machine can do this way, or remit the pay directly by mail, either to myself, or to any of the above-mentioned Express offices in this City, who will procure the machine of me and forward it, which they are in the habit of doing.

ERRATA.

On Title page, instead of postage 1 cent, should be 3 cents, if prepaid.

On page 93, in the directions for transferring Daguerrean Likenesses, after the words "and let the end of the wire dip down about half an inch into the solution of blue vitriol, in which the picture is suspended," should be added, *on the end of this wire should be suspended a piece of sheet copper, about two inches square.* The action of the battery should be kept up till there is a deposit of copper on the face of the picture, of sufficient thickness to allow of its being peeled off with a penknife. During the operation, it may be necessary to renew the solution of blue vitriol, in the battery, once or twice.

AMERICAN PRACTICE,

OR,

FAMILY PHYSICIAN

Condensed,

BY W. BEACH, M. D.

Complete in one volume. Illustrated with nearly 200 Engravings. Designed for the use of Families and Physicians. Fourteenth revised edition. The best work on Medical Botany and Surgery extant.

This incomparable book "embraces the character, causes, symptoms, and treatment of the diseases of men, women, and children of all climates," and comprehends the entire range of Hygeine, Medicine, Surgery, Midwifery, Materia Medica, and Pharmacy, which are illustrated with nearly two hundred Engravings—nearly one hundred of which are colored engravings of Botanical Plants. It is intended for families and for those who wish to prescribe for their own families, without resort to physicians.

It may be justly inferred that this work, the production of an American Physician, must be of superior merit from the fact that it has drawn from nine potentates of Europe, **GOLDEN MEDALS** as gifts, to its author: another evidence of its merit, is the fact that it has already passed through fourteen editions of 20,000 copies each, without in the least effecting a continual increasing demand for the work from every part of not only this country, but from a great part of the continent of Europe.

JAMES M'ALISTER,

Sole Proprietor, 141 Fulton Street, New York.

Also at his Store, corner of Houston and Norfolk Streets.

Grand Depot for Dr. Beach's Books and Medicine.

SANDS' SARSAPARILLA,

IN QUART BOTTLES.

FOR PURIFYING THE BLOOD, AND FOR THE CURE OF

SCROFULA,
Cutaneous Eruptions,
ERYSIPELAS,
PIMPLES,
Chronic Sore Eyes,
RHEUMATISM,
Old & Stubborn Ulcers,
FEVER SORES,
HIP DISEASE,
Syphilitic Symptoms,
LUMBAGO,
DYSPEPSIA,
Jaundice, Costiveness,
SALT RHEUM,
NIGHT SWEATS,
And Diseases arising from an Injudicious
USE OF MERCURY.

BRONCHITIS,
Weakness of the Chest,
COUGHS,
PULMONARY
AFFECTIONS,
And all other Diseases tending towards
CONSUMPTION,
LIVER COMPLAINT,
Female Irregularities and Complaints.
LOSS OF APPETITE,
Exposure or Imprudence in Life,
And as a Spring and Fall
Purifier of the Blood,
And General Tonic for the System, it stands
UNRIVALLED.

This preparation has now borne the test of over fourteen years' experience, since its first introduction to public favor, during which time numerous imitations have sprung into existence, founding their claims to the confidence of the community on the curative powers contained in Sarsaparilla Root—the great reputation and extended use of which has been mainly attributable to the many wonderful cures effected by the use of this preparation. While Sarsaparilla Root forms an important part of its combination, it is, at the same time, compounded with other vegetable remedies of great power, and it is on the peculiar combination and scientific manner of its preparation, that its remarkable success in the cure of disease depends. Other preparations imitate it in the style of putting up, and in bearing the name of one of its ingredients, and here ends their resemblance to it. Those needing a remedy and purifier like this, are requested to note where this difference exists, and in making choice of what they will use, not to take any other but that one entitled to their confidence, from the long list of cures it has effected on living witnesses, whose testimonials and residences have been published, and who are still bearing daily testimony to its worth.

Understanding, as physicians now do, the diagnosis of diseases, their proximate and exciting causes, and being in possession of appropriate remedies, many valuable lives are daily preserved, that must have been lost without this knowledge. The diseases for which Sands' Sarsaparilla is recommended, have all yielded to its influence, and it has now become a standard article of medicine throughout the American Continent, Europe, and the W. I. Islands. It has been approved by the medical faculty, introduced and extensively used in hospitals, under the watchful eye of physicians, with the happiest results. The preparation being entirely vegetable, renders its administration safe to the most enfeebled frame: its alterative and tonic properties give tone and energy to the system and by its use perfect and permanent health will follow.

Prepared and sold by **A. B. & D. SANDS,** Wholesale Druggists, 100 Fulton-street, corner of William, New York. Sold by Druggists generally.

DR. McMUNN'S ELIXIR OF OPIUM.

THIS IS THE PURE AND ESSENTIAL EXTRACT FROM THE NATIVE DRUG.

It contains all the valuable medicinal properties of Opium in natural combination, to the exclusion of all its noxious, deleterious, and useless principles, upon which its bad effects depend.

It possesses all the sedative, anodyne, and antispasmodic powers of Opium,

To produce sleep and composure. To allay convulsions and spasmodic action.

To relieve pain and irritation, nervous excitement and morbid irritability of body and mind, &c., &c.

And being purified from all the noxious and deleterious elements, its operation is attended by

No sickness of the stomach, no vomiting, no costiveness, no headache,

Nor any derangement of the constitution or general health.

Hence its high superiority over Laudanum, Paregoric, Black Drop, Denarcotized Laudanum, and every other opiate preparation.

The Elixir of Opium is also greatly superior to Morphine,

1. In its containing all the active medicinal virtues of Opium in native combination, and in being its full representative, while Morphine, being only one of its principles, cannot alone, and that in an artificial state of combination too, produce all the characteristic effects of so triumphant a remedy, when four or five of its other valuable principles are excluded.
2. In its effects, the Elixir is more characteristic, permanent, and uniform, than any of the *artificial compounds* of Morphine.
3. And as a *Preparation*, it is not liable to decompose or deteriorate like the *Solutions* of Morphine; and thus is obviated a serious objection, which has prevented the latter from being used with precision and effect.

To speak summarily, the Elixir of Opium, as a remedy, may be adopted in all cases in which either Opium or its preparations are administered, with the certainty of obtaining all their salutary and happy effects, without being followed by their distressing and pernicious consequences. And in the greatest number of those cases in which no other form of opiate can be used without occasioning the worst effects, it can also be used, with the most eminent success and the happiest results.

The discovery of this inestimable preparation, so highly purified from all the objectionable elements of the native drug, without ever changing or impairing its medicinal virtues or efficacy, is a triumph in the chemical analysis of opium never before achieved, and places the Elixir of Opium pre-eminent in the list of all the preparations of opium hitherto made.

Those who take opium and its ordinary preparations cannot be ignorant of the fact, that its distressing and pernicious effects result from the operation of its deleterious principles, and that the tremors, languor, and lassitude with which its devotees are afflicted, and for which they repeat the dose to relieve, are sensations of its own creation.

But in consequence of the exclusion of those deleterious principles from the Elixir of Opium, it is not liable to derange the functions of the system, nor injure the constitution and general health; hence its high superiority in all cases in which the long-continued and liberal use of opiates is indicated and necessary to allay pain and spasmodic action, and induce sleep and composure, as in cases of fractures, burns or scalds, cancerous ulcers, and other painful affections.

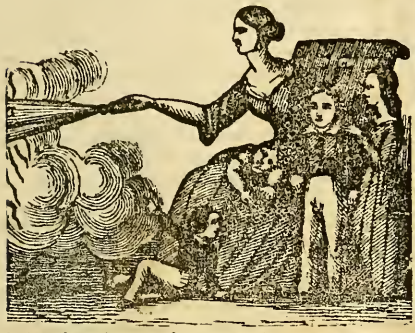
And to those persons who, from necessity or vitiated indulgence, have been accustomed to the use of opium, this preparation will afford a gratifying substitute, by which they may relieve themselves from the thraldom of a pernicious and too frequently inveterate habit.

It possesses yet another important advantage, which is of paramount consideration in the treatment of some of the most violent and dangerous spasmodic diseases, such as Tetanus, Epilepsy, Hysteria, Tic Douloureux, Convulsions in Hydrophobia, &c., &c., which is, that the quantity necessary to overcome and control diseased action in those dreadful maladies, is not limited by the deleterious influence of those objectionable principles, but can be given in large quantities with safety, inasmuch as their proportions in opium and its several preparations containing them, are so great, that by the time a sufficient quantity is taken for the anodyne and anti-spasmodic properties to allay and overpower the pain and spasmodic action in some of their most violent attacks, the poisonous influence of the objectionable elements will preponderate, and produce narcotism, stupor, and apoplectic death; and the patient dies the victim of the poisonous effects of the intended remedy, before the valuable properties can give the desired relief.

All orders from the "Trade" must be addressed, as heretofore, to **A. B. & D. SANDS**, Wholesale Druggists, 100 Fulton-street, corner of William, New York. Sold by Druggists generally.

DR. H. F. PEERY'S
VERMIFUGE, OR "DEAD SHOT" FOR WORMS.

A HIGHLY VALUABLE PREPARATION, CAPABLE, FROM THE PROMPTITUDE OF ITS ACTION OF CLEARING THE SYSTEM IN A FEW HOURS OF EVERY WORM.



There is perhaps no disease to which children are exposed so common and fatal as Worms; they imitate the symptoms of almost every other complaint, and often produce the most alarming effects before they are suspected. Some of the symptoms which are produced by the irritation of worms in the bowels are:—Countenance pale, tongue whitely furred, grinding of the teeth, fetid breath, stomach hard and swelled, wasting of the flesh, sickness and pains in the stomach bowels either too costive or too loose, great restlessness, colic, convulsions, fits, &c.

This preparation has the peculiar advantage of not only destroying every worm, but also of producing a healthy action of the stomach and other organs of digestion. The exceeding small quantity required to test the existence of worms, or to remove every one from the system, its operating in a few hours, together with its great certainty of effect, constitute it one of the most brilliant discoveries of the age.

The following was received through our Agent, Dr. WALTON, who says: "The Dead Shot has been introduced into the practice of some of our best physicians, and is highly approved and recommended; and were it necessary I could send you more than fifty certificates like the accompanying one, from men well known and of high respectability."

Clarksville, Ark., April 2d, 1851.

Messrs. SANDS:—Dr. Peery's "Dead Shot" is now extensively used in this section of country, and has performed some wonderful cures. One case came under my observation, in which a single dose brought away One Hundred and Ten Worms from a child six years old. Yours truly, JOHN S. PRICE.

Extract from a letter received from our Agent at Antigua, W. I.

St. Johns, W. I., Sept. 14, 1851.

Messrs. SANDS:—"The 'Dead Shot' is all sold, and I am very sorry you did not send six times the quantity. There has not been a single instance of failure where it has been used; and if certificates from this island would be of any use I could procure as many as would fill a quarto volume."

Yours truly, THOMAS G. CARROLL.

New York, May 5, 1846.

Messrs. SANDS: Gentlemen—I feel it to be both a duty and a pleasure to make known the great medicinal value of Dr. Peery's Vermifuge, as proved by its effects on two of my children. For nine months previous to using the "Dead Shot" Vermifuge, we had resorted to various worm medicines, which produced but partial relief; their sleep was broken, with great fretfulness and pains in the stomach, itching of the nose and other parts, and we were unable to rest at night, being obliged to wait upon and assist them all we could. I administered to each of them a dose of the "Dead Shot," which brought away large masses of worms in a decomposed state, and greatly relieved them. A second dose effectually removed all remains of worms; and their health has been entirely restored. RICHARD HALLORAN, No. 3 Crosby st.

Jeffress Store, Nottoway Co., Va., May 26th, 1848.

GENTLEMEN:—Your "Dead Shot" Vermifuge has been introduced into the practice of some of our best physicians, who highly recommend it for its valuable effects in expelling worms. Its efficacy has also been tested by several of our friends, one of whom said to us a few days since, that two teaspoonfuls brought away One Hundred and Eighty large Worms from a child of his, twenty-eight months old. If necessary, we could give you the names of several of the most respectable families in this vicinity, who have used it with the happiest success, and from our own observation and experience we can safely testify to its uniformly good effect. Yours respectfully, JEFFRESS & BRUCE.

Having purchased the entire right and interest of Dr. H. F. Peery, in 1846, in the Vermifuge, the article is prepared and sold, wholesale and retail, by **A. B. & D. SANDS**, Druggists, 160 Fulton-street, corner of William, New York. Sold also by Druggists generally throughout the United States. Price 25 cents per vial.

CLOVE ANODYNE TOOTHACHE DROPS.

AN IMMEDIATE AND PERFECT CURE.

Those who have felt the painful throbbing and excruciating pangs of this disease shooting through their jaws with most tormenting perseverance, and, as is often the case, have received but little sympathy from friends on such occasions, will no doubt be much pleased to know of a remedy that will never fail to quiet forever the unmerciful offender. The comfort that should be sought for is the Clove Anodyne Toothache Drops a remedy that while it removes the pain preserves the teeth, and thus blesses as well as benefits. These Drops have been extensively used, and thousands will bear grateful testimony to their value as a speedy and permanent cure for the toothache.

The following testimony is from one of our most distinguished practical Dentists:

New York, Dec. 19, 1844.

Messrs. A. B. & D. Sands: Gentlemen—In the course of my practice I have extensively used your Clove Anodyne with much success for the relief of the Toothache; and as I constantly recommend it to my patients, I deem it but just to inform you of the high opinion I have of it over other remedies. I am yours, very respectfully, M. LEVETT, Dentist,

260 Broadway, corner of Warren-street.

Prepared and sold, wholsale and retail, by A. B. & D. SANDS, Druggists and Chemists, 100 Fulton-street, corner of William, New York. Sold also by Druggists throughout the United States. Price 25 cents per vial.

ROMAN EYE BALSAM FOR WEAK AND INFLAMED EYES.

This Balsam is a prescription of one of the most celebrated oculists—has been a long time in use, and is confidently recommended to the public as the best and most successful salve ever used for inflammatory diseases of the eyes. In cases where the eyelids are inflamed, or the ball of the eye thickly covered with blood, it acts almost like magic, and removes all appearances of disease after two or three applications. Those whose eyes have been injured by close application to study, or by too fixed attention to minute objects, will obtain immediate relief by the use of this Balsam. In cases of partial loss of sight from inflammation, film, or advanced age, it is equally beneficial. Many cases of total blindness, that had existed for years, have been completely cured by it. In this case, "seeing is believing," and persons suffering in like manner, should remember that delay in diseases of the eye is always dangerous. The following certificates of its virtues will be read with interest by all thus afflicted:

Charleston, S. C., March 24, 1849.

Messrs. A. B. & D. Sands: Gentlemen—The Roman Eye Balsam you sent me has proved eminently successful. I used it on a member of my own family, who had been afflicted for years, and on whom I had tried numerous remedies in vain. I shall take great pleasure in recommending the Eye Balsam as a most valuable preparation. Respectfully, yours truly, P. MELVIN COHEN, M. D.

New Berlin, N. Y., April 18, 1847.

This may certify, that about ten years since I was attacked with inflammation in my eyes, and for two years I was quite unable to do any thing, being obliged, most of my time, to keep a cloth of some kind over my eyes so as to exclude all light. At the end of that time I obtained a temporary relief, though not a cure; this however was for only a short time, and from then till within a few months I was deprived of the use of my eyes entirely. I tried every remedy I could hear of, and consulted every physician I knew, but all to no purpose, and I had nearly abandoned all hope of a cure, when a neighbor recommended me to use the Roman Eye Balsam. I tried it, and it has quite cured my eyes, and I can say that I can see now as well as ever. HANNAH RATHBUN.

Put up in small jars, with full directions for use. Price 25 cents.

Prepared and sold, wholesale and retail, by **A. B. & D. SANDS,** Druggists, 100 Fulton, corner of William street, New York. Sold also by Druggists generally throughout the United States and Canadas.

COUNTWAY LIBRARY OF MEDICINE
QP
341
S65
1853

RARE BOOKS DEPARTMENT